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A
SYSTEM
OF
SURGERY.

BY

BENJAMIN BELL,
Member of the Royal College of Surgeons, one
of the Surgeons to the Royal Infirmary, and
Fellow of the Royal Society of Edinburgh.

ILLUSTRATED WITH COPPERPLATES.

VOLUME III.

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M,DCC,LXXXV.

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T O

The Honourable Lord ELLIOCK,

The Reverend Dr WILLIAM ROBERTSON Principal of the Univerſity of Edinburgh,

Dr JOHN HOPE Preſident of the Royal College of Phyſicians, and Profeſſor of Botany,

Dr WILLIAM CULLEN Profeſſor of Medicine, and Firſt Phyſician to his Majeſty in Scotland,

Dr ALEXANDER MONRO Profeſſor of Anatomy and Surgery,

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ALEXANDER HUNTER, Eſq; of Polmood,

Mr JOHN CARMICHAEL
Mr JOHN LEARMONTH } Merchants,

Mr WILLIAM INGLIS
AND } Surgeons,
Mr ALEXANDER WOOD

MANAGERS OF THE ROYAL INFIRMARY
OF EDINBURGH.

GENTLEMEN,

THE Hoſpital of which you have the government, the firſt of the kind in Scotland, was eſtabliſhed on principles no leſs liberal than humane. The advantages of it are not confined to one ſpot, or to perſons of any particular deſcription: It opens an aſylum, as far as the extent of its funds will permit, to the indigent and diſeaſed of every country and of every denomination.

The relief of the diſtreſſed, however, is not the only benefit derived from the Royal Infirmary. It ſerves alſo as a ſchool of inſtruction in the practical part of the Medical and Chirurgical Profeſſions, and enables the Profeſſors in the Univerſity, with no ſmall improvement to their numerous ſtudents, to illuſtrate and confirm the truth of thoſe doctrines which they deliver in their lectures.

I will not preſume to make any encomium on the manner in which you conduct the affairs of the charitable inſtitution under your charge. The exact attention; the ſkill and ſucceſs with which patients are treated in the Royal Infirmary; and the gratitude of a diſcerning and approving Public; are the moſt honourable and certain proofs of the prudence and integrity of your adminiſtration.

But I cannot refrain from expreſſing the ſenſe I have of the perſonal favours for which I am indebted to you. By your indulgence I was appointed, at an early period in life, to a charge in the Hoſpital, which gave me the beſt opportunity of becoming acquainted with diſeaſes, and of obſerving the treatment of them by the moſt able and experienced practitioners: And ſince that time, by having a ſhare in the chirurgical department of the Royal Infirmary, I have been enabled to exerciſe the operative part of my profeſſion much more frequently, and in a greater variety of caſes, than I could have done in my private practice.

Permit me to ſolicit your countenance

and protection to an extenſive work, intended to exhibit a Syſtem of Chirurgical Knowledge; with the improvement of which, the proſperity of the Hoſpital over which you preſide is nearly connected.—I have the honour to be, with the moſt perfect eſteem and regard,

GENTLEMEN,

Your much obliged

And moſt obedient humble Servant,

EDIN. Jan. 1. 1785.

BENJAMIN BELL.

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A
TREATISE
ON THE
THEORY AND PRACTICE
OF
SURGERY.

CHAPTER XXVI.

Of Affections of the BRAIN *from External Violence.*

SECTION I.

General Remarks on Affections of the BRAIN *from External Violence.*

AFFECTIONS of the Brain which occur as the conſequence of external violence, often produce a very complicated ſet of ſymptoms; are attended with nent danger, and give much embarraſsment to practitioners: Accordingly, both with reſpect to the hazard with which they are attended, and the difficulty which occurs in the treatment of them, there is not perhaps any claſs of diſeaſes to be compared with them. Wounds and bruiſes of the head, which at firſt exhibit no marks of danger, often induce a train of ſymptoms which elude the ſkill of the moſt experienced practitioner; and, without admitting of any mitigation, proceed to a fatal period, ending only with the death of the patient.

The very intricate nature of theſe diſorders has excited the attention of practitioners from the time of Hippocrates downwards; but although ſome material improvements have been introduced into this branch of practice by the induſtry and obſervation of modern ſurgeons; yet whoever is accuſtomed to the treatment of theſe complaints will allow, that our knowledge of them is ſtill very deficient. Authors of the laſt and preceding centuries have propoſed

poſed modes of treatment in affections of the head, which modern practitioners do not admit, whilſt in various points of importance ſurgeons of our own times differ materially from one another.

This uncertainty which prevails with reſpect to the nature and treatment of affections of the head proceeds from different cauſes, the principal of which appear to be the following.

I. The neceſſity of a ſound and entire ſtate of the brain for the purpoſes of life and health, together with the peculiar delicacy of its ſtructure, make injuries, which in other parts of the body would have no bad effect, when inflicted on this organ productive of the moſt alarming conſequences.

II. The brain being ſurrounded with a firm covering of bone, it is always difficult, and in many caſes impoſſible, to obtain an exact knowledge of the nature of the affection, and of the parts more immediately injured: And, while the attending ſymptoms lead us to preſume that the brain has ſuffered, when no external marks of injury appear, we are often at a loſs where to apply the inſtruments neceſſary for the patient's relief: For this reaſon we have not, perhaps in any inſtance, ſo much cauſe to regret our very limited acquaintance with diſeaſes, as in thoſe affections of the head of which we are now treating; in which diſcoveries are often made upon diſſection after death, a knowledge of which, if obtained a day or two ſooner, might have put it in our power to ſave ſome valuable lives.

III. The moſt material impediment to our ſucceſsful treatment of diſeaſes of this claſs, is the impoſſibility of obtaining an eaſy and free acceſs to them, when we know even with ſome certainty the parts chiefly injured. For, the brain being on all ſides ſurrounded with bone, we can rarely accompliſh ſo extenſive an expoſure of the parts affected as the proper treatment of them requires.

IV. The manner in which diſeaſes of the head from external violence have been commonly deſcribed, has had a conſiderable effect in rendering this part of practice perplexed and intricate. Authors who have wrote upon the ſubject have, till of late years, attended more to the conſideration of the cauſes which induce affections of the head, than to the real nature and treatment of the affections themſelves: Occupied almoſt entirely in deſcribing the former, they have very univerſally paſſed over the latter with too much remiſſneſs *.

Thus, the various contuſions and wounds to which the head is expoſed, have been particularly deſcribed; and every variety of fracture which can poſſibly happen has been mentioned with a minute accuracy. The moſt trifling differences that can occur, have been diſtinguiſhed by particular

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* The French authors upon this ſubject, were the firſt among the moderns who wrote with any kind of preciſion upon it. And among theſe, that judicious practitioner Monſieur Le Dran ſtands particularly eminent: I need ſcarcely obſerve too, that the public are much indebted to our countryman Mr Pott, for his valuable work upon this ſubject.

ticular appellations, and much ingenuity has been exerciſed in deſcribing the extent with reſpect to length and breadth, and every other circumſtance relative to the figure of a fracture: points of very little importance; and which, when ſo much inſiſted upon, tend to perplex not only the younger, but even the more experienced part of the profeſſion. Nothing can ſet the impropriety of ſuch diſtinctions in a ſtronger point of view, than our obſerving daily that no advantage is derived from them. It is the effect which fractures and other injuries have upon the brain, which we ought to conſider, and not their external appearances.

If indeed the effects produced upon the brain by a fracture of the ſkull could be determined by the ſize and figure of the fracture, it might be proper to pay attention to the deſcription of it: But every practitioner knows that this is not the caſe. Fractures of the ſmalleſt ſize will in ſome inſtances be attended with the moſt dangerous ſymptoms, whilſt in others thoſe of the greateſt extent produce no alarming appearance whatever. So long as it was imagined that the danger induced by accidents of this nature was in proportion to the ſize and figure of a fracture, we need not be ſurpriſed at the attention with which theſe circumſtances were treated; but now that we know that no advantage can be derived from diſtinctions of this kind, we ſhall not conſider it as neceſſary to dwell particularly upon them.

Theſe are the circumſtances which render the management of affections of the brain from external violence uncertain. In the ſubſequent part of this chapter I ſhall endeavour to point out the means beſt calculated to extricate this part of practice from ſuch uncertainty: but before proceeding to do ſo, it will not be conſidered as impertinent our giving a conciſe anatomical deſcription of thoſe parts which are moſt apt to ſuffer from injuries done to the head; by which means the ſubject will be rendered more clear and intelligible.

SECTION II.

Anatomical deſcription of the Brain and ſurrounding parts.

THE brain and cerebellum, with their membranes the dura and pia mater, have for their protection a covering of bone, the Cranium.

The cranium conſiſts of eight bones, forming an oblong vault or box, flattened on the ſides by the ſuperior firmneſs of the lower part of the temporal bones, and by the conſtant action of the temporal muſcles: It is more capacious on the back part than before, the lobes of the brain being here more extenſive.

The bones of the cranium or ſkull, are, the frontal bone, the two parietal bones, the two temporal, the occipital, the ſphenoid, and ethmoid. The firſt ſix of theſe are ſaid to be proper to the ſkull, the two laſt being conſidered as common to it and to the face. The os frontis forms all the anterior or fore part of the cranium, the

oſſa

parietalia the middle and upper part, and the os occipitis the poſterior part of it: The oſſa temporum form the lower part of the ſides of the cranium, and the ſphenoid and ethmoid bones form the centre, or what is commonly termed the baſis of the ſkull; but as theſe two laſt mentioned bones lie ſo deep as to be entirely out of the reach of any chirurgical operation, any injury to which they may be expoſed muſt in almoſt every inſtance prove fatal.

The other ſix bones are connected together by joints, or indentations, termed ſutures, which are five in number, the coronal, ſagittal, lambdoid, and two ſquamous. The coronal ſuture extends over the head, from within a ſhort ſpace of the external canthus of one eye, to within an equal diſtance of the other on the oppoſite ſide of the head; and in its courſe it ſerves to unite the frontal bone to the anterior edge of the two parietal bones.— The ſagittal ſuture unites the parietal bones on the ſuperior part of the ſkull, by running almoſt in a direct line from the middle of the frontal bone to the middle of the os occipitis: In ſome inſtances this ſuture proceeds along the whole extent of the os frontis, and terminates immediately above the noſe, by which that bone is divided into two equal parts; and it has been ſaid that inſtances have occurred of the occipital bone being divided in a ſimilar manner. This, however, is confeſſedly a rare occurrence.

The lambdoid ſuture, ſo called from its reſemblance to the Greek letter Λ, begins, where the ſagittal ſuture terminates, at the middle of the ſuperior edge of the occipital bone; and its two crura or legs ſtretching down to the baſis of the ſkull, ſerve to unite this bone to the poſterior edge of the two parietal and temporal bones. It is in the courſe of this ſuture, namely, the lambdoid, that theſe ſmall irregular oſſifications, termed oſſa triquetra, are moſt commonly met with. In ſome inſtances they penetrate the whole thickneſs of the bone; but in others, they are chiefly confined to the external lamella of the ſkull, being

ing ſcarcely to be obſerved internally. The laſt ſutures we have to mention are the two ſquamous, which ſerve to unite the ſuperior part of the temporal bones to the under and correſponding parts of the oſſa parietalia.

In young people theſe five ſutures are almoſt univerſally met with, and it is neceſſary that practitioners ſhould be well acquainted with their direction; but it is proper to obſerve, that in older ſubjects ſome of them are often wanting. Inſtances are even ſaid to have been met with in which all the ſutures were completely obliterated; but this we believe to be a very rare occurrence. The ſagittal and coronal ſutures, are thoſe which are moſt frequently wanting.

Various advantages have been ſuppoſed to occur from the formation of the ſkull by ſeparate bones; but what particularly relates to our ſubject to mention is, that at the ſutures, a more direct communication by means of blood-veſſels takes place between the membranes of the brain and the teguments of the ſkull than could otherwiſe have been admitted; and by means of theſe ſutures too it is ſuppoſed that fractures will not ſpread ſo extenſively as if the whole cranium was formed of one bone only.

There is reaſon indeed to think, that ſome advantage is in this manner derived from the ſkull being formed of different bones; as in the early ſtages of life, while the bones are not firmly connected together, fractures do not ſo readly paſs acroſs the ſutures as they afterwards do: but nature muſt ſurely have had ſome other intention in this mechaniſm, otherwiſe the more perfect adult would not probably be deprived of an advantage which the earlieſt period of childhood enjoys in greater perfection; and although we have ſaid, that the ſutures have evidently ſome influence in young people of ſtopping the progreſs of fractures, their effect in this reſpect is very inconſiderable; for daily obſervation evinces, that fractures paſs from one bone of the ſkull to another even while the ſutures remain in every reſpect entire: a circumſtance which every young practitioner eſpecially ſhould be aware of; for from many obſervations to be met with in ſome of our older writers, we would be apt to imagine that fractures rarely if ever traverſe the ſutures, which however they are frequently found to do.

The bones of the ſkull are for the moſt part compoſed of two lamellæ or tables, which are ſeparated from one another by a kind of bony net-work, or cancelli, commonly termed the Diploë. The external table is every where conſiderably thicker than the internal, which is firm, compact, and more brittle than the other; a circumſtance which readily accounts for an occurrence which is ſometimes met with in practice, namely, a fracture and even a depreſſion of this internal table of the ſkull, while the external ſurface of the bone remains entire: but it unfortunately happens, that thediſcovery of this is ſeldom or never made, till it is too late to reap any advantage from it; I mean, not till after the death of the patient.

In the directions given by authors for the operation of the trepan, we are commonly deſired to proceed with much caution in carrying the inſtrument through the inner table of the ſkull, while we are told that no danger can enſue from proceeding quickly in the firſt part of the operation till the outer table and diploë are fairly penetrated. This however proceeds upon the ſuppoſition of the two tables of the ſkull with the intermediate diploë being at all times to be diſtinguiſhed from one another. Now we know, that this is by no means the caſe; for the diploë diminiſhes gradually by age, and in many inſtances it has been ſo completely obliterated as to take away entirely the appearance of two tables of the ſkull over the whole upper part of the head: and beſides, there are ſome parts of the ſkull where the diploë is naturally wanting, particularly in different parts of the os occipitis, owing to the preſſure produced upon this bone by the muſcles with which it is covered. It is alſo wanting at the under part of the os frontis, where the two lamellæ of this bone ſeparate immediately above the eye-brows in order to form the two cavities of the frontal ſinuſes; whilſt in general it is more diſtinctly obſerved over all the ſuperior part of the frontal bone, and through the whole extent of the oſſa parietalia, than in any other part of the ſkull.

The external ſurface of all the bones which compoſe the ſuperior part of the cranium is in general very ſmooth and equal, as is alſo the internal ſurface of the ſame parts of theſe bones, excepting the temporal bones and ſome part of the oſſa parietalia, in which ſeveral deep furrows are commonly met with, produced by the pulſation of the arteries of the dura mater. But although the upper part of the ſkull is commonly ſmooth, almoſt the whole under part of it is very rugged and unequal. This inequality on the outſide ſeems to be calculated for the better attachment of the different muſcles which move the head;

and on the inſide it ſerves the purpoſe of ſupporting the different parts of the brain and cerebellum.

Almoſt the whole of the occipital bone is very unequal both in its external and internal ſurfaces; this is likewiſe the caſe with all the inferior part of the temporal bones, and with the under part of the os frontis; and therefore it is obvious, that none of theſe ſituations are ſo proper for the application of the trepan, as the more ſmooth and equal parts of the ſkull.

The ſkull is externally covered with the common teguments of the body, the ſkin, and cellular ſubſtance; with the frontal, occipital, and temporal muſcles, and an aponeurotic expanſion formed by a combination of the tendinous fibres of all theſe muſcles; and more immediately by the pericranium, a very ſtrong membrane which adheres firmly to every part of it, but particularly at the ſutures.

It has by many been ſuppoſed, that the cavity formed by the bones of the ſkull, is not naturally completely filled. This, however, is now known to be an erroneous opinion; for every part of this cavity is occupied by the brain and cerebellum, with their inveſting membranes the dura and pia mater.

The dura mater, which is a ſtrong inelaſtic membrane, adheres every where to the internal ſurface of the ſkull by an infinite number of ſmall vaſcular filaments, as is evident by thoſe innumerable points of blood which appear over the ſurface of this membrane, and through the whole internal ſurface of the ſkull, on the cranium and dura mater being forcibly ſeparated from one another.—This adheſion, however, of the dura mater to the cranium is much more firm at the ſutures than in any other part, owing to the blood-veſſels which paſs out here being not only more numerous, but of greater magnitude than in the reſt of the ſkull. In other parts of the head, any veſſels which paſs from the dura mater to the ſkull ſeem to be chiefly intended to ſupply the internal table and the diploë with blood; but at the ſutures an evident communication takes place by means of blood-veſſels between the external coverings of the ſkull and the membranes of the brain; a circumſtance which practitioners ought to be aware of, as it not only ſerves to explain many of the phenomena which occur from injuries done to the head, but likewiſe points out the moſt probable means of guarding againſt them. By our knowledge of this part of the anatomy of the head we learn, that the ſutures are not the moſt eligible parts for the application of the trepan: On the contrary, that this operation ought never to be performed in the courſe of a ſuture, if the ſame intention can be anſwered by applying the inſtrument on any other part; and that, by the firm adheſion of the dura mater to the ſkull at the ſutures, matter or blood collected on the ſurface of that membrane on one ſide of a ſuture, will not be evacuated by a perforation made on the oppoſite ſide of it.

The dura mater, the firmneſs of which renders it extremely proper to ſupport the brain by its different productions, is of too hard a texture to be immediately connected with that very delicate organ. It is therefore every where lined with another ſoft membranous expanſion, the pia mater, which is immediately applied over the whole ſurface of the brain and its convolutions.

The great quantity of blood ſent to the brain and its coverings is ſupplied by the carotid and vertebral arteries, and is again returned by the jugular veins; but before reaching theſe veins, it is emptied into a number of ſinuſes or reſervoirs, formed by productions or duplicatures of the dura mater: Theſe ſinuſes all communicate with one another, and they are very numerous on the back part of the head: but the moſt material for ſurgeons to be acquainted with, are the longitudinal, which runs along the middle and upper part of the head directly in the courſe of, and firmly attached to, the ſagittal ſuture; and the two great lateral ſinuſes, in which the longitudinal ſinus terminates at the middle and upper part of the cerebellum, at which part theſe two ſinuſes commence, the one going to the right and the other to the left, and paſſing down to the baſis of the ſkull, they there terminate in the jugular veins.

This general account of the anatomy of theſe parts will ſerve to render the conſideration of the injuries to which they are liable more clear and intelligible; and a more minute deſcription of them would not only be incompatible with the nature of this work, but would not be in any reſpect neceſſary for our ſubject; for the moſt exact deſcription that can be given of the different parts of the brain would be of no advantage to practitioners in the treatment of thoſe affections to which it is liable. We may in general obſerve upon this point, that the brain is an organ eſſentially neceſſary for life; and, that its parts cannot be deranged, either by wounds, contuſions, or compreſſion, but with the utmoſt hazard: for although we ſometimes meet with inſtances of the brain being much injured, and even of parts of it being evacuated at wounds, without any important conſequences enſuing; yet theſe are rare occurrences, and are by no means ſufficient to invalidate this general obſervation, that a ſound and entire ſtate of this organ is highly neceſſary for the purpoſes of life.

I ſhall now proceed to treat more particularly of the nature of thoſe injuries to which the parts that have juſt been deſcribed are liable; and in doing ſo, inſtead of enumerating in ſeparate ſections, as has commonly been done, the various cauſes of affections of the head, and the ſymptoms produced by each of theſe, I mean to conſider the general effects which ſuch cauſes have upon the brain, and to point out the manner in which they appear to operate, together with the means which from experience have been found moſt effectual in preventing a fatal termination of them.

All the ſymptoms of affections of the brain from external violence ſeem evidently to originate from one or other of the following circumſtances; namely, from compreſſion of the brain, from commotion or concuſſion, and from inflammation. Theſe we ſhall proceed to conſider in ſeparate ſections, in the order they are here mentioned; and as far as the intricate nature of the ſubject will admit, we ſhall treat of them as diſtinct and unconnected with each other: for although we are not to expect that the ſymptoms ariſing from the circumſtances now enumerated, are always diſtinctly and preciſely marked, and without connection with one another; yet it frequently happens that they are ſo, and it is in their ſeparate uncombined ſtate only that any deſcription can be given of them. Practitioners of experience muſt indeed know, that cauſes frequently occur, by which all the affections of the brain we have mentioned are induced at the ſame time in the ſame patient: And in ſuch inſtances, the ſymptoms which they produce are no doubt ſo very confuſed as to be with much difficulty diſtinguiſhed; Thus, a ſtroke upon the head, attended with ſymptoms of concuſſion, is frequently accompanied with thoſe which proceed from compreſſion; and theſe again are in ſome inſtances ſucceeded by all the ſymptoms of inflammation.

The appearances which are induced by the various combinations of theſe can be learned only from practice and obſervation; but an accurate knowledge of them as they occur in a ſeparate and unconnected ſtate, will contribute much in directing the proper treatment of them under whatever form they may occur.

SECTION III.

Of Compreſſion of the Brain from external violence.

A GREAT variety of ſymptoms are enumerated by authors as indicating a compreſſed ſtate of the brain from external injuries; but the moſt frequent, as well as the moſt remarkable, are the following: Giddineſs; dimneſs of ſight; ſtupefaction; loſs of voluntary motion; vomiting; an apoplectic ſtertor in the breathing; convulſive tremors in different muſcles; a dilated ſtate of the pupil, even when expoſed to a clear light; paralyſis of different parts, eſpecially of the ſide of the body oppoſite to that part of the head which has been injured; involuntary evacuation of the urine and fæces; an oppreſſed, and in many caſes an irregular, pulſe; and when the violence done to the head has been conſiderable, it is commonly attended with a diſcharge of blood from the noſe, eyes, and ears.

Some of the milder of theſe ſymptoms, ſuch as vertigo, ſtupefaction, and a temporary loſs of ſenſibility, are frequently induced by ſlight blows upon the head: And as they often appear to be more the conſequence of a ſhock or concuſſion given to the ſubſtance of the brain, than of compreſſion induced upon it; ſo they commonly ſoon diſappear, either by the effects of reſt alone, or of the other means we ſhall afterwards have occaſion to point out. But when any of the other ſymptoms take place, ſuch as convulſive tremors—dilatation of the pupils—involuntary paſſage of the urine and fæces—and eſpecially when much blood is diſcharged from the noſe, eyes, or ears, we may always conclude with a good deal of certainty that much violence has been done to the brain, and that compreſſion in one part or another is induced upon it.

In the anatomical deſcription of the cranium and brain, we obſerved, that the cavity of the ſkull in a natural ſtate is completely filled by the brain, no vacuity whatever being left between them: It therefore neceſſarily follows, that compreſſion of the brain will be produced by whatever tends to diminiſh this cavity.

A diminution of the cavity of the cranium may be effected by various cauſes; by fractures attended with depreſſion of any part of the bones of which it is compoſed; by the forcible introduction of any extraneous body through both tables of the ſkull; and by the effuſion of blood, ſerum, pus, or any other matter. The ſame effect may be likewiſe produced by the thickening of the bones of the head in lues venerea, and by the collection of water in the ventricles of the brain in caſes of hydrocephalus internus.

Theſe two laſt mentioned cauſes, however, proceed from, and are connected with, diſeaſes which it is not our buſineſs in this place to conſider. The effuſion of pus or any other kind of matter not evidently either blood or ſerum, muſt always be the conſequence of inflammation, and will be taken into conſideration in a different ſection. As the introduction of extraneous bodies into the brain muſt always be attended with a fracture and depreſſion of ſome part of the ſkull, the conſideration of the one is neceſſarly connected with that of the other. We ſhall now therefore proceed to ſpeak more particularly of fractures attended with depreſſion, and ſhall afterwards conſider the other general cauſe of compreſſion of the brain, effuſion of blood or of ſerum.

§ 1. *Of Compreſſion of the Brain from Fractures attended with Depreſſion of the Skull.*

FRACTURES of the ſkull, as we have already obſerved, have been diſtinguiſhed by a variety of appellations according to their figure, extent, &c. But to retain theſe diſtinctions could anſwer no good purpoſe; and as it might embarraſs the younger part of the profeſſion, we do not mean to introduce them.

The only general diſtinction of fractures which it is neceſſary for us to retain is, into thoſe which are attended with depreſſion, and thoſe which are not. All the variety of the latter we mean to comprehend under the denomination of Fiſſures; but the conſideration of theſe belongs more properly to a different ſection.

Fractures of the ſkull may be effected in various ways: By falls from a height; by blows with ſharp or blunt inſtruments; and by miſſile weapons, ſuch as ſtones, balls, &c. thrown from a diſtance.

Authors who have entered minutely into this part of the ſubject obſerve, that much advantage may be derived in the treatment of fractures, from a knowledge of theſe circumſtances; and that we may even aſcertain with ſome preciſion, the degree of violence that has been done to the brain, from being acquainted with the cauſe which produced the injury.

Although it is proper for every practitioner to inquire into the nature of the cauſe by which a fracture has been effected, yet we are by no means to imagine that any material advantage is to be derived from this ſource: we know indeed, that a fracture of the ſkull produced by a blow with an obtuſe or blunt inſtrument, or by a fall from a conſiderable height, is frequently attended with more alarming ſymptoms than a fracture of the ſame extent produced by a ſharp inſtrument. This, however, is far from being univerſally the caſe; and as it is impoſſible to aſcertain the extent of any injury done to the brain by this circumſtance, little or no dependence ought to be placed upon it.

In the management of fractures of the ſkull attended with depreſſion, the indications are,

1. To diſcover as exactly as poſſible the ſite, the courſe, and the full extent of the fracture.

2. To obviate the effects of the injury done to the brain, by elevating or removing all the depreſſed parts of the bone.

3. To endeavour to complete the cure by the application of proper dreſſings, and attention to after-treatment.

Theſe are the objects which in accidents of this nature we ought to have in view. In many inſtances, we are prevented by the ſituation of the fracture and other circumſtances from effecting them; but in others, when theſe indications can be accompliſhed, we are frequently able to afford more certain relief to patients, than it is ever in our power to do in the treatment of any other malady.

In fractures of the ſkull, the teguments correſponding to the injury done to the bone, are frequently cut, lacerated, or even altogether torn away. When this is the caſe, the ſtate of the bone is at once rendered evident; the fracture is immediately diſcovered, and the ſurgeon is left at liberty to employ the moſt proper means for obviating the effects of it: But when the ſkin and other teguments are entire, it often happens, even when from a concurrence of circumſtances we are tolerably certain of the exiſtence of a fracture, that much difficulty occurs in aſcertaining it.

When any external mark of injury is met with, particularly when a tumour is obſerved in any part of the head, with evident appearances of its proceeding from a recent contuſion, the attending ſymptoms will in all probability be found to originate from a fracture directly underneath; and on the bone being laid bare, in the manner we ſhall afterwards mention, the courſe of the fracture will in general be diſcovered.

But every practitioner knows, that injuries done to the head frequently produce affections of the brain, and even fractures of the ſkull, without leaving either tumour or any other external mark by which they can be diſcovered. In this ſituation, the whole head ſhould be ſhaved, when it will ſometimes happen, that an inflammatory redneſs of a particular ſpot, and which could not be obſerved till the hair was removed, will lead to a diſcovery of the part affected. But when no tumour, inflammation, or any other mark of injury is diſcovered, we may on ſome occaſions be directed to the ſeat of the accident, by preſsing firmly over the whole head; and if we find upon repeated trials, that preſſure produces more pain in one particular part than in others, a circumſtance of which we may be convinced if the patient moans much upon preſſure being applied to it; and if he puts up his hand or draws away his head on this trial being repeated, we may conclude with much probability that this is the ſeat of the injury.

In circumſtances, ſuch as we are now conſidering, ſo fraught with danger to the patient, and ſo perplexing as they frequently are to practioners, nothing that can throw light upon the nature of the caſe ſhould be overlooked. If the patient raiſes his hand, and frequently applies it upon or near to the ſame part of the head, even this will merit attention; for in this manner the ſite of a fracture has, in ſome inſtances, been diſcovered.

When therefore the ſymptoms of a compreſſed brain are evidently marked, we ought, without heſitation, to proceed to examine the ſtate of the cranium wherever appearances clearly point out, or even where they lead us only to conjecture where a fracture is. We do this by laying the bone bare by making an inciſion with a ſcalpel through all the external coverings of the ſkull.

In performing this operation, when the bone is previouſly found to be much injured, which in ſome inſtances is the caſe even where no laceration occurs in the ſkin directly above it, the inciſion through the integuments ſhould be made with much caution; otherwiſe the brain may be hurt, either by the knife preſſing in ſome portion of detached bone upon it, or even by the point of it paſſing in between two of the ſeparated pieces. But when the bone upon which the inciſion is made, is not either broke into different pieces, or when the edges of the fractured pieces have not receded from one another, and do not in any degree yield to preſſure; the diviſion of the ſkin and other teguments may be then performed with freedom, by cutting thro' the whole of them down to the bone, with one ſtroke of the ſcalpel.

The ſole intention of this operation is to bring thoſe parts of the bone which have been injured clearly into view; but altho' the means of effecting this ought to be extremely ſimple, a very painful and ſevere method has been commonly recommended.—It has been in general ſuppoſed, that in fractures of the ſkull, the parts affected cannot be ſufficiently expoſed, either for the purpoſe of tracing the courſe of the fracture, or, when neceſſary, for applying the trepan, unleſs a portion of the ſkin and other teguments be altogether removed: And with this view, ſome have adviſed a crucial inciſion to be firſt made, and the corners to be cut off. Others have recommended an inciſion of the form of the letter T; while by many we are directed to remove a circular or oval piece of the teguments at once.

Various objections, however, occur to all of theſe.—They not only produce a painful wound, which is commonly very difficult to heal, but by expoſing a conſiderable part of the ſkull tedious exfoliations ſometimes take place, which might have been prevented; and the covering which nature afterwards provides for the denuded bone never anſwers the purpoſe ſo completely as the teguments which were removed. Even all of theſe objections, however, to the practice we have mentioned, ſhould be conſidered as trifling, and ought not to be attended to, if by more ſimple means we could not diſcover the extent of fractures, and if we could not likewiſe by the ſame means apply the trepan, or any other remedy which the treatment of them might require. But as both of theſe objects can perhaps in every inſtance be accompliſhed by a leſs exceptionable method, the other ought to be laid aſide.

Upon a ſimple inciſion being made in the manner we have directed, the teguments always retract ſo conſiderably as to admit of a very free examination of the now denuded bone; and if a fracture is diſcovered, its courſe may be always traced juſt as effectually by this inciſion being extended along that part of the bone in which it is found to run, as if a conſiderable portion of the teguments was removed: And the ſame retraction of the divided parts will in almoſt every inſtance admit of the application of the trepan. In a few caſes, it may be neceſſary to remove a ſmall corner of the teguments which have been divided: but this I know from experience is very ſeldom the caſe; and whenever it is found to be ſo, a very ſmall portion only of the ſcalp ſhould be taken away.

Upon the teguments being divided, if the ſkull is found to be fractured and depreſſed, the nature of the caſe becomes at once clear and obvious; and the means which we ſhall afterwards point out for the treatment of fractures attended with depreſſion, ſhould be immediately employed. But even in caſes where no outward appearance of a fracture is met with, and where no tumour, diſcoloration, or other external mark of injury is diſcovered, if the patient continues to labour under ſymptoms of a compreſſed brain; if the pericranium has been ſeparated from the bone; and eſpecially if this laſt has loſt its natural appearance, and has acquired a pale white or duſky yellow hue; the trepan ought to be applied without heſitation at the place where theſe appearances mark the exiſtence of ſome injury.—We ſhall afterwards endeavour to ſhow, that, by this means alone, blood or ſerum, which may have been effuſed, and by which the compreſſion may be induced, can be removed; for it would be highly improper in caſes of this nature, to truſt to the abſorption of the extravaſated fluids as by ſome we are adviſed to do; the chance of a cure from this quarter being extremely doubtful.

Again, although no mark either of fracture, or of any diſeaſe underneath, ſhould appear on the external table of the bone newly laid bare, yet there is a poſſibility that the internal table may be fractured and depreſſed. This indeed is not a common occurrence, but various inſtances of it are recorded by authors: I have met with it in two caſes, and other practitioners, on whoſe accounts I can place the moſt perfect confidence, likewiſe mention it.

We formerly obſerved, that the internal table of the ſkull is thinner and more brittle than the external: how far theſe circumſtances will explain the fact we have now mentioned, I will not pretend to ſay;

but this is certain, that the injury done to the brain by a fracture and depreſſion of the internal table of the ſkull will be as great, and will prove as certainly dangerous, as if the whole thickneſs of the bone had been beat in upon it: This is therefore another motive for the application of the trepan in every caſe accompanied with ſymptoms of a compreſſed brain, even where no external marks of injury can be diſcovered.

It will happen indeed in many inſtances, that no relief will be obtained from the application of the trepan, even where the ſymptoms are evidently ſuch as proceed from a compreſſed ſtate of the brain induced either by a depreſſed portion of bone, or by extravaſation of blood or ſerum. This want of ſucceſs from the operation of the trepan may proceed from cauſes which we ſhall afterwards have occaſion to mention: but the moſt fatal in general of all of them, is that which we commonly term a contra-fiſſure, and what the French term a contre-coup;—in which the ſkull is fractured and ſometimes depreſſed, and blood or ſerum perhaps effuſed on the ſurface of the brain, at a part very diſtant from that which received the blow, and where alone there is any apparent or external mark of miſchief.

Many have doubted the reality of ſuch an occurrence; for, as it cannot be eaſily accounted for, ſo it is alleged that it has rarely or perhaps never been met with.—As it is not our intention in this work, to enter into minute theoretical diſcuſſions, we ſhall not attempt to explain the manner in which contra-fiſſures of the cranium may be produced; and ſhall juſt ſhortly obſerve, that doubts upon this point can have been entertained by ſpeculative writers only; for every practitioner of experience muſt have met with different inſtances of ſeeing the exiſtence of contra-fiſſures clearly aſcertained.

I will not pretend to ſay, that a blow received on one ſide of the head will neceſſarily and certainly produce a fracture or other mark of injury on the oppoſite ſide; neither does it appear, that the part exactly oppoſite to the place where the blow has been received, will ſuffer more readily than other parts of the head, at the diſtance of only two or three inches from it. All I wiſh to eſtabliſh upon this point is, that the ſkull may be, and frequently indeed is fractured in parts not immediately contiguous to thoſe upon which the blows producing the fractures were inflicted; and that this often happens when no external mark can be diſcovered upon the teguments correſponding to ſuch fractures, and while the bone remains perhaps altogether entire on the part which more immediately received the injury.

We ſhall therefore conſider it as matter of fact, that the ſkull in many inſtances is liable to be fractured in parts at ſome diſtance from thoſe which have more directly received an injury; and ſome advantage we think may be derived from having this in our view.—In ordinary practice, if no benefit is reaped from the application of the trepan; if there is no fracture diſcovered of the internal table of the ſkull, or no extravaſation on that part of the brain newly denuded by a removal of a piece of the bone; and if blood-letting, laxatives, and the other means uſually employed, do not remove the ſymptoms of compreſſion; it is in general concluded, that they depend, either upon a concuſſion of the brain, or on extravaſation in ſome of the internal parts of it where the effects of an operation cannot reach; and accordingly the patient is left to his fate, without any attempt being made for his relief.

In this, however, I think we are liable to much juſt cenſure and blame: For altho' a patient in ſuch circumſtances muſt undoubtedly be conſidered to be in great danger, and although the chance of his recovering by any means that can be employed is very inconſiderable, yet ſtill he ought to receive this chance: Nothing we can probably attempt will add to the hazard of his ſituation; ſo that if there is the leaſt probability of any advantage being to be obtained from any thing in our power to accompliſh, it ought not to be omitted.

The whole head ſhould be again examined with much accuracy; and by preſſing firmly, ſlowly, and deliberately, over every part of it, if even the ſmalleſt degree of ſenſibility remains, the patient will complain, either by moans or ſigns with his hands, when preſſure is applied to any part that is fractured. I have ſeen different inſtances of fractures being detected in this manner, which in the ordinary way of ſearching for them would have eſcaped notice.

In whatever part of the head the patient complains, on preſſure being applied to it, the ſkull ſhould be laid bare by an inciſion in the manner we have mentioned.—If both tables of the ſkull are fractured and depreſſed, the cauſe of all the miſchief will thus be diſcovered: But even although no ſuch depreſſion or fracture ſhould be met with in the external lamella of the bone; as there is at leaſt ſome chance of miſchief being met with underneath either from a fracture of the internal table or from extravaſation, and as nothing can poſſibly ſave the patient but the removal of this, the trepan ought to be immediately applied; and wherever there is the leaſt reaſon to ſuſpect, either from pain being induced from preſſure applied in the manner we have directed, or from any other circumſtance, that miſchief may be concealed, ſo long as relief has not been obtained by what was previouſly done, the operation ought ſtill to be repeated, as being the only means from whence any advantage can be derived.

This, however, leads to a point which will require a farther and more extenſive diſcuſſion; I mean, the effects produced upon the brain by the removal of a portion, or perhaps of different portions, of the cranium by the trepan.

By many of our older writers on this ſubject it is ſaid, that the uſe of this remedy muſt always be attended with conſiderable hazard; and in ſupport of their opinion they not only adduce a variety of facts, but employ much ingenious reaſoning on the probable influence of the air finding a free acceſs to the ſurface of the brain, an organ which nature ſeems to have taken particular pains to protect from it.

Practitioners of modern times, however, have adopted a very different opinion upon this point; and they even go ſo far as to ſay, that no bad effects can be ever produced by the application of the trepan conſidered abſtractedly; and that in fact this operation never proves dangerous of itſelf, and is occaſionally only apparently ſo, by being employed for the removal of ſymptoms, for which this as well as every other remedy is altogether inadequate. In conſequence of this, the trepan, in every injury to which the head is expoſed, is applied with much freedom: In moſt inſtances, probably with much propriety; but in others, I am convinced, with very dangerous conſequences.

In our practice we ſhould endeavour to avoid both extremes. For, although I am perfectly clear and decided upon the propriety of applying the trepan wherever it is indicated by ſymptoms of a compreſſed brain; and where theſe ſymptoms muſt in all probability prove fatal, if the cauſe which produced them is not ſoon removed; yet I am equally ſatisfied, that it is the preſence of ſuch ſymptoms only which ought to indicate this operation; and that it ought never to be employed, as it too frequently has been, merely for the prevention of them.

In the one caſe, no additional riſk can be incurred by the uſe of the trepan; and as the patient will in all probability ſuffer if it be not employed, no doubt ſhould be entertained of adviſing it: But, as I am perfectly convinced, from attentive obſervation of the effects of this operation upon the brain, that it is by no means an innocent remedy, and on the contrary, indeed, that it is frequently productive of dangerous ſymptoms which otherwiſe would not have appeared, I would never think of adviſing it but for the removal of ſymptoms already induced; that are evidently of a dangerous tendency; and that cannot be obviated in any other manner.

We ſhall again, in a ſubſequent part of this chapter, when treating of fiſſures, have an opportunity of entering upon this ſubject more minutely. In the mean time, as we are preſently to deſcribe the operation of the trepan, I thought it proper in this general way to mention the opinion I had formed of the nature of it.

Having thus conſidered the firſt general indication to be kept in view in the treatment of fractures attended with depreſſion of the ſkull, we now procced to the conſideration of the ſecond, which comprehends the means beſt adapted for the removal or elevation of a depreſſed portion of bone. We have already ſeen, that ſome variety occurs in fractures attended with depreſſion; and the means employed for the removal of them, are likewiſe various.

In accidents of this kind, it ſometimes happens, that the correſponding teguments are either altogether removed by the cauſe which produced the injury, or at leaſt are ſo much lacerated as to admit of a free examination of the bone; but when it is otherwiſe, and the teguments are either not divided in any part, or are not ſufficiently laid open, the firſt object of the ſurgeon, as we have already obſerved, ſhould be, to get the head ſhaved, and then to divide the ſkin and other teguments with a ſcalpel through the whole extent, and directly upon the courſe of the fracture or other injury. If a fracture is met with, and if it is found to proceed in a ſtraight line, this inciſion ſhould have the ſame direction: Or if it takes an angular courſe, the inciſion ſhould likewiſe do ſo; for the ſole object of the one is to bring the other as completely as poſſible into view.

In making an inciſion in the manner we have now mentioned, it frequently happens that one or more blood-veſſels are divided, which continue for ſome time to diſcharge feely; and theſe we are commonly directed, before proceeding farther, to ſecure by ligatures. If the patient is naturally weak, or if a ſufficient quantity of blood has been already evacuated, this will no doubt be proper: But as the membranes of the brain are commonly much injured by depreſſions of the ſkull, and often ſuffer much from inflammation; and as nothing in general proves ſo effectual in removing or preventing this as a plentiful diſcharge of blood from the contiguous parts; the arteries which have been divided by the inciſion ſhould be always allowed to bleed in proportion to the patient's ſtrength, when they will commonly retract, and give no farther trouble; but if they ſtill continue to diſcharge, they can be eaſily ſecured by a proper application of ligatures.

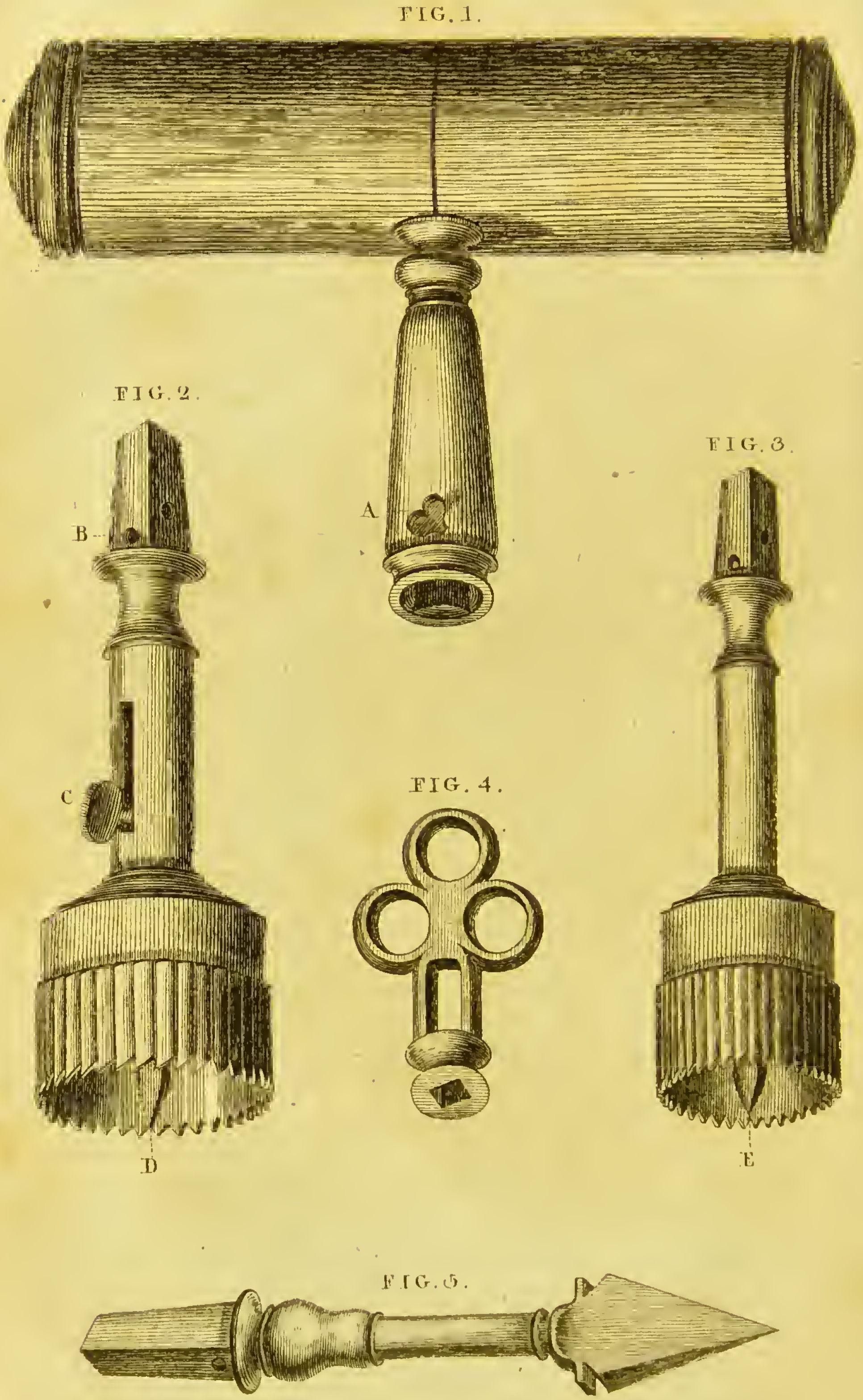
It is ſcarcely neceſſary to obſerve, that as patients in every ailment bear the loſs of blood eaſieſt in a horizontal poſture; ſo, in the operation of which we are now treating, it is of importance to attend to this. In moſt caſes of this kind the patient is commonly indeed allowed to remain in bed; but the head and body being ſupported, as is uſually done, by aſſiſtants, all the advantages to be derived from a horiſontal poſture are thus in a great meaſure loſt; and beſides, the height of a bed is not in general ſufficient for admitting of that freedom and eaſe to the operator which ſuch a tedious operation, as this very commonly proves, evidently requires. For theſe reaſons, nothing anſwers ſo well as laying the patient upon a firm table of an ordinary height; and his head being placed upon a pillow, it can in this manner be preſerved more firm and ſteady than by any other means, while at the ſame time all the advantages of an horiſontal poſture are obtained.

The larger arteries which have been divided being ſtopt, either by ligatures or any other means, we are commonly directed to delay the remaining ſteps of the operation, either for a few hours or perhaps till the following day, in order to have all the oozing from the ſmaller veſſels entirely removed: But as ſoon as the principal veſſels have been ſecured, any diſcharge from the reſt of the wound proves very inſignificant; and as it may always be eaſily commanded by the edges of the inciſion being covered with dry lint and moderately compreſſed by an aſſiſtant, and as the preſſure on the brain ſhould always be removed as quickly as poſſible, the operation ought to be finiſhed immediately.

The extent of the fracture being determined in the manner we have mentioned, and the blood from the inciſion being entirely ſtopt, we are now to endeavour to elevate the depreſſed portion of bone: The propriety of this meaſure is ſufficiently evident: It has been admitted by practitioners of every age; but they have differed much in the mode of effecting it.

The practitioners of the laſt and the preceding centuries were in general timid in every operation of importance, and eſpecially in ſuch as were performed upon the head; and as they were commonly averſe, as we have already remarked, to expoſe any conſiderable part of the brain, they endeavoured to elevate depreſſions of the cranium, either without penetrating the

PLATE XXV.



[illegible] sculp

the bone at all, or by making very ſmall perforations only.

For the purpoſe of preforating the ſkull, a kind of circular ſaw, which has commonly been termed a Trepan, and of which we ſhall give a delineation, was always employed; but the opening formed by it was ſo very ſmall, that it required a great number of applications of it, even in ordinary caſes, to accompliſh the views of the operator: Many inconveniences enſued from this; to remedy which, various improvements upon this inſtrument were ſuggeſted, and figure 1. Plate XXVII. repreſents the reſult of all of theſe. Thus improved, it removes a much larger piece of bone at once; and as it is entirely cylindrical, it penetrates the ſkull more eaſily than a conical ſaw, which till of late was the only form in uſe.

In one circumſtance, however, relating to this inſtrument, modern ſurgeons have not made any improvement, but have rather injured it materially by forming it ſo as to render the operation of preforating the ſkull with it both more difficult and more tedious than is neceſſary. The inſtrument delineated in Plate XXVII. cuts the bone not only quickly, but, in the hands of thoſe accuſtomed to uſe it, with perfect ſafety. The timidity of ſome operators however has made them imagine, that this inſtrument cannot be uſed but with conſiderable hazard of paſſing too ſuddenly through the bone at the end of the operation, by which the brain would be unvoidably injured; and they have accordingly invented another, which neceſſarily divides the bone very ſlowly, and which they therefore ſuppoſe will perform the operation with more ſafety. This inſtrument is termed a Trephine, and is delineated in Plate XXVI. fig. 1. It is not however poſſeſſed of any advantage over the other, not even that of being more ſafe for perforating the bone: For the ſame degree of force muſt be applied by the operator with each of them; and it has this very material defect, that it requires more than double the time to perform the ſame operation

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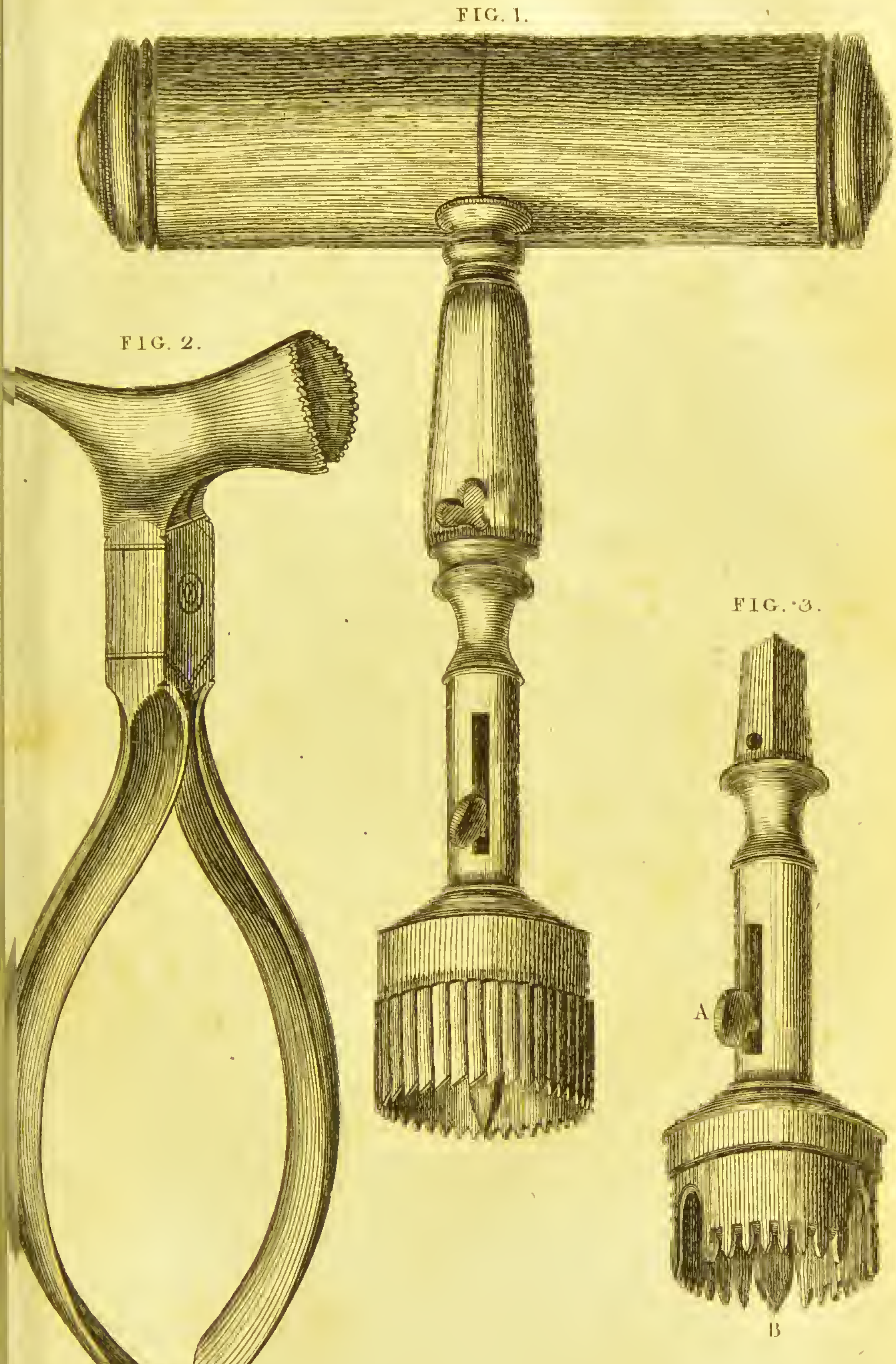
PLATE XXVI.



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that is neceſſary with the trepan. It has now, however, been long almoſt the only inſtrument employed for this purpoſe in many parts of Europe, eſpecially in Britain; ſo that the prejudice in favour of it may probably continue it in uſe; but whoever will attend to the principles on which the trepan and it are formed, will ſoon ſee that the trepan is greatly preferable.

When it was neceſſary to penetrate the ſkull, the trepan, in its then unimproved ſtate, was formerly the inſtrument chiefly employed. Others indeed were uſed for the purpoſe of forming openings in the bones: But they were ſo extremely rude and unmanageable, that it is not neceſſary to give any deſcription of them; and this eſpecially as delineations of all of them may be ſeen in the writings of almoſt every chirurgical author of the two preceding centuries*. But, in many caſes of fractures and depreſſions of the ſkull, it was formerly imagined that the trepan was not by any means neceſſary, as it was ſup-

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* Vide the works of Hildanus, Scultetus, Dionis, &c.

poſed that in moſt inſtances the depreſſion might be elevated by more ſimple means; and thoſe which we find to have been moſt depended upon, are the paſſing of a ſcrew in a ſlow and gradual manner nearly through both tables of the depreſſed piece, which was now to be elevated or raiſed into the place it formerly occupied, by the ſcrew being ſlowly and firmly pulled upwards: And again, in thoſe depreſſions of the ſkull which occur in children, in whom the bones are more ſoft as well as more yielding, and which are ſuppoſed frequently to occur without any fracture, we are adviſed to cover all the depreſſed bone, or merely the teguments correſponding to it when they have not been previouſly divided, with leather ſpread with adheſive plaſter, and then by means of ſtrings or cords fixed to the back part of the leather to elevate the depreſſion.

Whether a depreſſion ever occurs, however, even in very early periods of life, without a correſponding fracture of at leaſt one of the tables of the ſkull, is much to be doubted. I rather think that it never does, at leaſt I never met with it, and I have ſeen different inſtances which previouſly were ſuppoſed to be ſuch, but which, after death, were all except one found to be attended with complete fractures; and in this the oſſeous fibres of the internal table of the bone were cracked or ruptured, while thoſe of the outer table remained nearly entire. But whether a depreſſion of this kind ever occurs, or not, is not material: the ſame means which we ſhall preſently point out for elevating fractures and depreſſions of the ſkull will prove equally uſeful in caſes of this nature; while we may freely venture to ſay, that no dependence whatever ſhould be placed upon the effects of adheſive plaſters as they are evidently very inadequate for the intended purpoſe.

With reſpect to the utility of a ſcrew for raiſing depreſſed portions of the cranium, the powers of ſuch an inſtrument would no doubt in many inſtances be fully ſufficient for elevating the depreſſion, but as it could neither remove any ſharp points of bone which might be beat in upon the brain nor ſerve to evacuate any effuſed blood, which frequently accompanies fractures attended with depreſſion, this means of removing depreſſed portions of bone will never probably be received into general uſe.—It has commonly too been objected to this inſtrument, that it cannot be introduced but with conſiderable hazard of forcing the depreſſed piece of bone upon which it is applied farther in upon the brain; and therefore that much miſchief muſt thus be induced by it.—In many inſtances, however, the ſcrew might be employed without any injury being done in this manner; for the force neceſſary to paſs forward a ſcrew is very inconſiderable; ſo that unleſs where a portion of bone is altogether detached from the reſt of the cranium, a ſcrew might frequently be introduced into the depreſſed piece with little or no hazard of forcing it in upon the brain.—If therefore the other objections I have adduced to it were not material, the latter in various caſes would not be of much importance.

portance. And as ſome practitioners may incline to have it in their power in particular inſtances to employ an inſtrument of this kind, I have therefore thought it right to give this account of it.

We ſhall now proceed to deſcribe the practice of modern ſurgeons in fractures attended with depreſſion of the ſkull, together with ſuch improvements as it may appear to admit of.

The fractured part of the bone being brought into view by the diviſion of the teguments in the manner we have directed, and the flow of blood being likewiſe ſtopped, the exact ſituation of the depreſſed piece or pieces of the cranium is next to be attended to. In ſome inſtances the depreſſed portion of bone is altogether ſeparated from the reſt of the ſkull: In others, it adheres at one or two points: Whilſt in ſeveral caſes, a fiſſure or rent is diſcovered with one ſide of the bone beat down below the plane or level of the other.

When a portion of the cranium is broke into ſeveral pieces, as they would not probably unite, either with one another, or with the ſurrounding bones, we are in general deſired to remove them: But when there is only one piece of bone depreſſed, and eſpecially if this adheres at a point or two to the contiguous bones, practitioners have in many inſtances attempted to replace it, in order, as they ſay, to avoid that expoſure of the brain which the removal of a large portion of the cranium muſt always occaſion; and they allege as a juſtification of the practice, that in ſome inſtances it has been found to ſucceed, by the fractured and depreſſed part uniting firmly with the ſound bone.

It is not, however, the unexpected ſucceſs of a particular kind of treatment of a few caſes by which we are to be directed: It is the reſult of general obſervation only which ought to determine our practice. Whatever may have occurred to a few individuals, while they have endeavoured to preſerve detached portions of the cranium, practitioners of experience and obſervation will allow that more real advantage is in ge-

general to be derived from a contrary management.

It happens almoſt univerſally, when one or more pieces of the ſkull are either entirely or nearly ſeparated from the reſt, that blood in a greater or ſmaller quantity is effuſed upon the ſurface of the brain, or upon the dura mater, through the whole extent of the detached portions; ſo that, if any part of theſe is allowed to remain, neither this extravaſated blood, nor the matter which afterwards forms, can find a free vent; and if any of the replaced pieces ſhould not afterwards adhere, as would frequently be the caſe, a good deal of trouble would thus be produced to the practitioner as well as to the patient.——But the removal of the ſeparated pieces obviates every inconvenience of this kind. A free vent is thus given to any blood that may be preſently effuſed, or to the matter which may form in future; the ſtate of the dura mater, and if neceſſary of the brain itſelf, may be freely examined; and inflammation and gangrene alſo, to which theſe parts are liable from accidents occaſioning fractures, are thus more effectually guarded againſt than they could be by any other means.

We would not mean, however, to recommend this practice of denuding any conſiderable part of the brain, excepting in thoſe caſes where a portion of the ſkull is entirely ſeparated from the reſt, and where the detached piece would do more harm by being allowed to remain, than can probably occur from removing it.

When the depreſſion is formed by different ſmall portions of bone, the whole of them may in ſome caſes be eaſily removed by a pair of forceps; and by removing that portion firſt, which appears to be moſt detached, the reſt will thus be looſened, and will therefore be more eaſily taken out. But it ſometimes happens even when ſeveral portions of bone are beat in, and very commonly when the depreſſion is formed either of one piece entirely ſeparated, or of a portion of the ſkull forced in upon the brain without any of it being al-

altogether detached, that the depreſſed pieces cannot be either removed, or even raiſed into a level with the reſt of the ſkull, in any other manner than by making one or more perforations in the contiguous ſound bone, for the purpoſe of introducing an inſtrument termed a Levator, with a view to elevate the portion forming the depreſſion.

It is for this purpoſe chiefly that the trepan is employed; ſo it is evident, that this operation is rendered unneceſſary whenever the depreſſed pieces of bone can be removed in the manner we have mentioned; the ſole intention of it being thus accompliſhed by more ſimple, and in general by more effectual means. —But when the depreſſed portions of bone are ſo firmly connected together that they cannot be elevated but with ſome riſk of wounding the brain or its membranes, a circumſtance which frequently happens, the trepan ought without heſitation to be employed. We ſhall now deſcribe the method of performing this operation.

In books of ſurgery, particular directions are commonly given with reſpect to the parts of the ſkull which may with ſafety be trepanned; and much pains have been taken to point out thoſe which ought to be avoided. In practice, however, limitations of this kind can ſeldom be attended to, as we muſt always perform the operation near to the part where the depreſſion occurs, ſo that a choice of ſituation is very rarely in our power: But, as it appears from the anatomical deſcription we have given of the different parts which may be concerned in this operation, that it may not only be performed with more ſafety in ſome parts than in others, but with more real proſpects of advantage, practitioners ought to be ſo far directed by this, as to avoid, as far as can poſſibly be done conſiſtently with the advantage of the patient, all thoſe parts from whence much riſk might occur from a perforation being made in them. The parts which with this view we would wiſh to avoid, are, almoſt all the under part of the temporal and parietal bones; all the under part of the occipital bone; the inferior part of the frontal bone; and the whole courſe of the longitudinal ſinus.—The internal ſurfaces of the greater part of the two firſt of theſe bones are furrowed, as we have ſeen, with the large arteries of the dura mater; a conſiderable part of the occipital bone is not only very unequal, but various ſinuſes are immediately covered by it; the frontal ſinuſes lie in the inferior part of the frontal bone; and although we know that wounds of the longitudinal ſinus do not always prove mortal, yet as it tranſmits a great quantity of blood, we ought to be very cautious in injuring it.

Theſe are the parts of the ſkull which in this operation we would at all times wiſh to avoid, and which we ought by no means to touch when our intention can be anſwered equally well by perforations made in the contiguous parts. But when the depreſſed pieces of bone are ſo ſituated as to render it impoſſible to raiſe them without applying the trepan over theſe parts, as the patient muſt certainly ſuffer if the depreſſion be not ſpeedily removed, no delay ſhould be allowed in applying the trepan wherever this can be done with any probability of ſucceſs. We are not wantonly and unneceſſarily to perforate the ſkull where parts are ſituated which it might prove hazardous to wound; but when the life of a patient depends upon the operation, no practitioner, it is hoped, will ever decline it when it is poſſible to perform it.

Of all the ſituations we have mentioned, the moſt inconvenient for the application of the trepan, is, the back part of the head upon the occipital bone, and the frontal ſinuſes immediately above the orbits. Beneath the former we have ſeen that ſeveral large ſinuſes are diſperſed, and both the external and internal ſurfaces of this bone are very unequal. And again, the two lamellæ of the frontal bone are ſeparated ſo far from each other by the frontal

PLATE. XXVII.

FIG. 2.

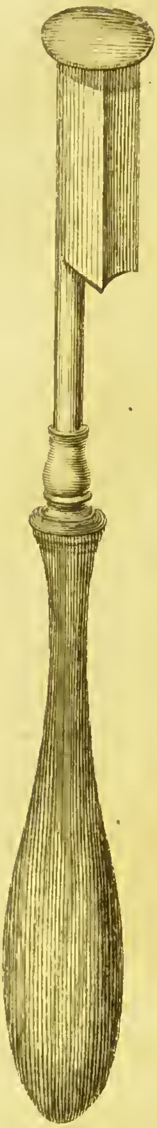


FIG. 1.

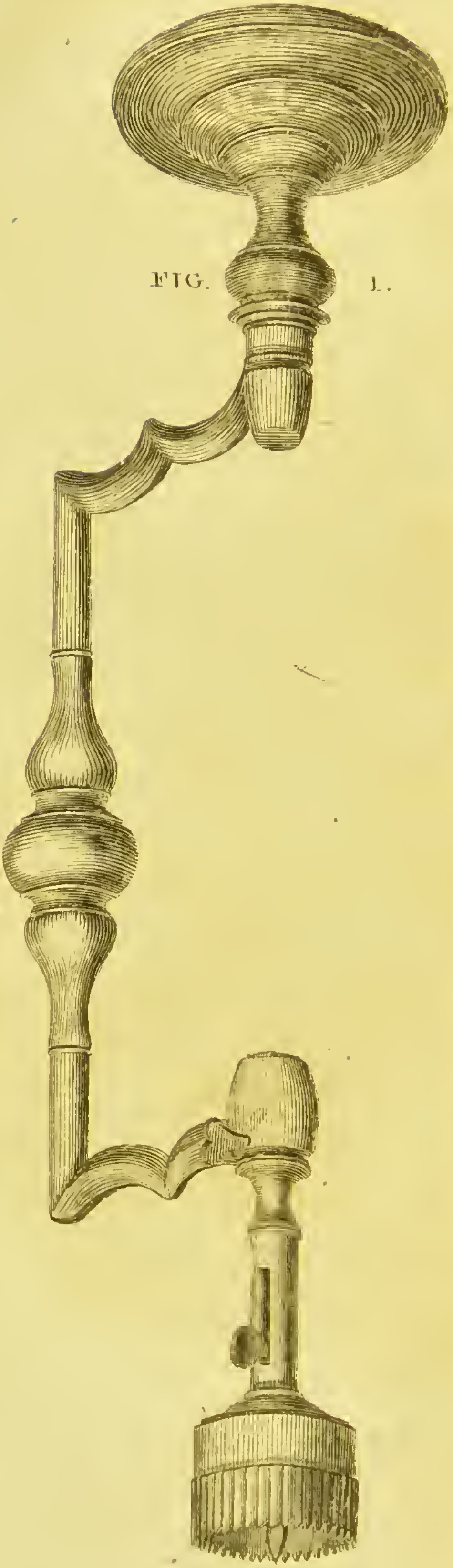
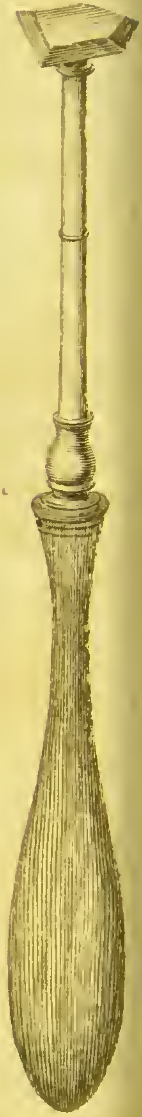


FIG. 3.



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frontal ſinuſes; and the internal ſurface of the bone at this part is ſo very unequal, that no practitioner would make choice of it for forming a perforation in. But caſes may occur, in which it may be proper to apply the trepan in both of theſe places: Wherever a fracture or any other cauſe of a compreſſed brain is ſo ſituated, that relief cannot be otherwiſe obtained; and where the patient muſt otherwiſe die, no difficulty ſhould deter us.—The muſcles of the occiput may be diſſected off from the part where the trepan ſhould be applied: And, with caution and attention, a perforation may be made through the frontal ſinuſes.

The inſtruments in common uſe for this operation are the following: A Raſpatory for the purpoſe of removing the perioſteum, repreſented in Plate XXVII. fig. 3. A Perforator, Plate XXV. fig. 5. The Trephine itſelf, Plate XXVI. fig. 1. An inſtrument termed a Lenticular, Plate XXVII. fig. 2. A pair of Forceps, Plate XXVI. fig. 2. and an Elevator repreſented in figures 1, 2, and 3. Plate XXVIII.

In proceeding to the operation, after the patient is laid upon a table in the manner we have directed, with his head firmly ſecured by aſſiſtants, if we were to follow the uſual practice, we ſhould lay a conſiderable portion of the ſkull bare round the part intended to be perforated. But this ought by no means to be imitated; for although it is neceſſary to remove as much of the pericranium as may admit of the head of the inſtrument being applied as frequently as it can be needed, yet more than this ought not to be removed: tedious exfoliations of ſuch parts of the bone as are thus denuded, would moſt probably be the conſequence; a circumſtance which not only renders the cure extremely tedious, but which adds to the real hazard of the operation.

We are, therefore, either with a ſcalpel or with the raſpatory, to ſeparate and remove juſt as much of the pericranium as will admit of a free application of the trepan; and the part at which this ſhould be done, ought to be exactly at that point where the greateſt reſiſtance ſeems to occur to the elevation of the depreſſed piece of bone; and in order to receive every poſſible advantage from the perforation, it ought to be ſo formed as to include not only the fracture or fiſſure, but if poſſible a ſmall portion of the depreſſed piece. The weight and preſſure of the inſtrument during the operation, ought no doubt to reſt almoſt entirely on the ſound undepreſſed bone, as much injury might be done to the brain by cauſing it to preſs much upon the piece which forms the depreſſion: but it very commonly happens, that a ſmall ſegment of the opening may be made with perfect ſafety upon the depreſſed bone; and as the advantages which reſult from this in the ſubſequent ſteps of the operation, are conſiderable, it ought in perhaps every inſtance to be attempted.

The pericranium being removed, a ſmall hole is then to be made in the undepreſſed bone with the perforator, care being taken to have it ſo near to the fracture, that the head of the trepan to be afterwards applied may include a portion of the depreſſed piece. So ſoon as this hole is ſufficiently large for receiving the point of the pin in the centre of the circular ſaw, this ſhould be inſerted into it, by which the ſaw is firmly preſerved in one place, till ſeveral turns being made with it, an impreſſion of a ſufficient depth is formed in the bone for retaining it, when the pin ſhould be removed: for, by projecting paſt the edge of the ſaw, it might injure the membranes of the brain before the perforation was properly completed; and as the ſole purpoſe of this pin is to fix the inſtrument during the firſt part of the operation, it becomes unneceſſary ſo ſoon as a cut is formed in the bone ſufficient for retaining it.

The ſurgeon ought now to proceed to finiſh the perforation by preſſing upon the inſtrument with a moderate and equal firmneſs: For if more preſſure be applied to one ſide of it than to another, the diviſion of one part of the bone will be ſooner completed than that of the reſt; a circumſtance which ought to be guarded againſt as much as poſſible, for reaſons too obvious to be mentioned. If the trephine is employed, all the preſſure and force neceſſary for turning the inſtrument is applied by one hand of the operator; the ſaw is made to cut by forming half a circle only, or ſcarcely ſo much; and the perforation is finiſhed by moving the ſaw backward and forward till the whole thickneſs of the bone is divided: But when the trepan is made uſe of, the ſurgeon applies all the preſſure that is neceſſary upon the head of the inſtrument with one hand, while he turns the handle of it with the other. Some operators indeed make the preſſure upon it with their forehead, or with their chin; but it is much more eaſily and more equally applied by one hand, than it poſſibly can be in any other manner. By the trepan the ſaw is made to move always in the ſame direction, by which it cuts more eaſily, and performs the operation in one-third of the time that is neceſſary with the trephine. When only one perforation is re-

required, this is not indeed an object of much importance; but as it often happens that ſeveral perforations are neceſſary, and as the operation is of conſequence fatiguing to the operator and diſtreſſing to the patient, that method of operating ought ſurely to be preferred which renders the operation more eaſy, provided it is at the ſame time equally ſafe. Now, for the reaſons we have mentioned, it is perfectly obvious, that the trepan operates with much more eaſe than the trephine; and whoever has ſeen the operation done with them both, will confeſs that it likewiſe does it with as much ſafety: For in the hands of thoſe accuſtomed to uſe it, there is no more riſk as has been commonly alledged, of wounding the brain by paſſing too ſuddenly in upon it with this inſtrument, than there is with the trephine. If the ſurgeon is cautious, there is no hazard of this with either of them; and if he is not attentive to what he is about, the trephine will be productive of as much miſchief as the other; But independent of this conſideration, the trepan operates with ſo much more eaſe than the other with reſpect to the patient, that even on this account it ought to be preferred. When the trephine is employed, the head is frequently ſo much jolted by the unequal motion of the inſtrument, as not only to be productive of much uneaſineſs when the patient is in any degree ſenſible, but likewiſe to have ſome influence in promoting that inflammatory ſtate of the dura mater which the violence done to it by the depreſſed bone has already induced, and from which more real danger is in many caſes to be dreaded than from the depreſſion itſelf.

Some practitioners, very ſenſible of theſe advantages of the trepan, but dreading the riſk of its paſſing too ſuddenly in upon the brain, commence the operation with this inſtrument, and finiſh it with the trephine*: This is far preferable to the

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[*] This, I believe, was firſt ſuggeſted by our preſent celebrated Profeſſor of Anatomy, Doctor Monro, to whoſe ingenuity ſurgery in many points of importance is much indebted.

uſual method of performing the operation entirely by the trephine; but thoſe who have fully experienced the advantages of the trepan, will employ it for the whole operation.

But which ever of theſe inſtruments are employed, the operator ſhould proceed with great ſteadineſs, and with as equal a degree of preſſure as poſſible till the perforation is completed. For this purpoſe, the inſtrument ſhould be frequently taken out, and the depth of the cut examined by introducing the point of a probe or of a ſharp-pointed quill in the form of a tooth-pick: If the perforation is found to go deeper in one part than in others, care ſhould be taken to accommodate the preſſure ſo as to preſerve the cut equally deep in every part, or nearly ſo, to the laſt.

At each time of removing the inſtrument, while the ſurgeon is employed in diſcovering the depth of the cut, and in clearing it of blood and particles of bone, an aſſiſtant ſhould have the charge of clearing the ſaw with a ſmall bruſh: Or, what anſwers ſtill better than this, there may be two inſtruments with the ſaws exactly of the ſame ſize; ſo that while one is employed by the ſurgeon, an aſſiſtant may be cleaning the other.

When the diploë preſents, attention to this circumſtance of cleaning the ſaw frequently, becomes more eſpecially neceſſary, as the blood diſcharged from this part of the bone and the ſpongy cancelli of which it is compoſed, if they are not often removed, tend conſiderably to obſtruct the progreſs of the operation: But we ought not to expect to meet always with the diploë; for as it is altogether wanting in ſome parts of the ſkull, and as it becomes in every inſtance more inconſiderable by age, ſo it is evident that it is not to be found in every caſe. The general direction, therefore, which is given for performing the firſt part of this operation freely and ſpeedily till the diploë is met with, cannot with ſafety be admitted: Every ſtep of it ſhould be done, as we have ſaid, with ſteadineſs; but with ſuch caution, as to prevent every chance of the brain or its membranes being injured by the inſtrument being puſhed forcibly in upon them.

But if caution is neceſſary in the firſt, it becomes much more ſo in the latter part of this operation: So that in proportion to the progreſs of the ſaw, it ought to be more frequently removed; and as ſoon as the point of a probe, or of a ſharp quill, is found to paſs entirely through at any one part of the cut, the preſſure ſhould be altogether removed from this point, and ſhould be equally applied over the remaining uncut part. By proceeding cautiouſly in this manner, the bone will ſoon become looſe in different points; and on this being diſcovered, it may either be taken out by the forceps repreſented in Plate XXVI. fig. 2. or the points of two levators being inſinuated into the bottom of the cut formed by the ſaw, one on each ſide of the piece to be removed, it may in this manner be eaſily and ſafely taken out.

We here think it neceſſary to remark,

that practitioners in general are too anxious about the total ſeparation of the piece of bone by means of the ſaw, before any attempt is made to remove it, from a fear of injuring the dura mater if any ſplinter ſhould be left by forcing it out before it is altogether cut through: With a view to avoid this, they direct us to proceed with the ſaw till the bone is entirely ſeparated; and in order to bring it out with the laſt removal of the inſtrument, the head of the ſaw till very lately has always been of a conical form, by which mechaniſm we are told, the piece of bone will very commonly be taken out along with it.

But, however plauſible the reaſons for this practice may appear, it ought by no means to be adopted; for it rarely or never happens, that the piece of bone taken out by the trepan is of an equal thickneſs in every part; ſo that if the ſaw be continued to divide one ſide of it long after the other has been cut through, the dura mater immediately under the point which was firſt divided, muſt for certain be lacerated by the teeth of the inſtrument, notwithſtanding all the caution that can be employed: Of this I have ſeen ſuch a number of inſtances, even in the hands of very expert ſurgeons, that I have no heſitation in conſidering it as an improper practice. Indeed, in various caſes, where the operation has been ſuppoſed to have been very properly performed, the mark of the ſaw has after death been very evidently diſcovered on the dura mater over the whole circle of the perforation. Inſtead of proceeding with the ſaw, therefore, till the piece of bone is entirely ſeparated, it will always be ſafer to force it out in the manner we have mentioned, ſo ſoon as it is diſcovered to be looſe at one or two points; and even although ſome ſmall fragments or ſplinters of bone ſhould be left, no diſadvantage would enſue from this, as they can be eaſily removed by a pair of forceps without any injury to the dura mater.

In addition to what we have ſaid reſpecting the form of the ſaw, we may remark, that the cylindrical ſhape is in every reſpect preferable to the conical, which in ſome parts of Europe is ſtill uſed. We have already obſerved, that it is not by the figure of the inſtrument that we are to avoid the danger of wounding the dura mater and brain, but by proceeding thro' every ſtep of the operation with very great caution; and while the conical ſaw is not neceſſary for removing the piece of bone newly divided, it does not penetrate the bone with the ſame eaſe as a cylindrical ſaw, neither is the piece of bone taken out by it ſo large, unleſs the ſize of the inſtrument is conſiderably larger than any that has yet been employed.

This circumſtance, we muſt obſerve, of the ſize of the opening to be made by the inſtrument, is an object of importance, and ought to be particularly attended to: For, as the intention of perforating the ſkull, is to relieve the brain from a ſtate of compreſſion, produced either by depreſſion of the ſkull, or by extravaſation of blood or ſome other fluid; as this is much more effectually performed by a large than by a ſmall opening; and as the pain and hazard of the operation are the ſame in both; a large opening is always preferable. The perforation made by the head of the trepan ſhould never in an adult be leſs than an inch in diameter.

The piece of bone being taken out, as we have directed, by a pair of forceps; if any ſplinters or points are found to remain, they may be removed either with the forceps, or with the lenticular, but the latter is ſeldom neceſſary: This being accompliſhed, we are now to proceed to the main object of the operation, to elevate the depreſſion of the cranium.

If the depreſſed piece of bone was prevented from being raiſed or taken out, as often happens, merely by its being firmly wedged in at one point; and if the trepan has been made to include this point, as it ought to have done; the whole piece, as it is thus entirely or nearly ſeparated from the reſt of the ſkull, may be now eaſily removed by a pair of forceps; or if it ſtill ad-

adheres at another point or two, the trepan muſt be again applied at each of theſe before any attempt ſhould be made to remove it. But when the depreſſed portion of bone is not ſo much ſeparated from the reſt as to render it proper to remove it, our next object is to raiſe or elevate this into a level with the reſt of the ſkull.—— The point of the inſtrument we have already mentioned, termed a Levator, being introduced at the opening newly made, and being puſhed in below the edge of the depreſſed bone, by preſſing down the other end of the levator, a very conſiderable degree of force may thus be applied; and if the depreſſion is not firmly wedged in, it commonly proves ſufficient for raiſing it: But when the depreſſed piece is either of conſiderable extent, or gives much reſiſtance at one or more points, before any attempt is made with the levator, the trepan ſhould be again applied wherever it may appear to be in any degree neceſſary; and by a proper uſe of the levator at theſe different

ferent openings, the depreſſion muſt be effectually raiſed.

The levator in common uſe, however, is not the inſtrument we wiſh to recommend: for with it all the preſſure employed for elevating the depreſſion falls upon the contiguous parts of the ſkull, the inſtrument being made to reſt or preſs upon the oppoſite ſide of the perforation, by which a conſiderable degree of violence is in many inſtances done to it; and as we have it in our power to accompliſh the ſame intention in an eaſier manner, the other ought to be avoided.—By having the elevator fixed upon a pin ſupported by a ſmall frame upon two feet, and the frame being placed at a proper diſtance from the wound, the preſſure that is made by this means falls upon a ſound part of the ſkull: It is not confined to one point, and conſequently no inconvenience ariſes from it; neither does there any difficulty or embarraſſment occur from the application of it; for it is perfectly ſimple in its conſtruction, and may be moved with much eaſe

PLATE. XXVIII.

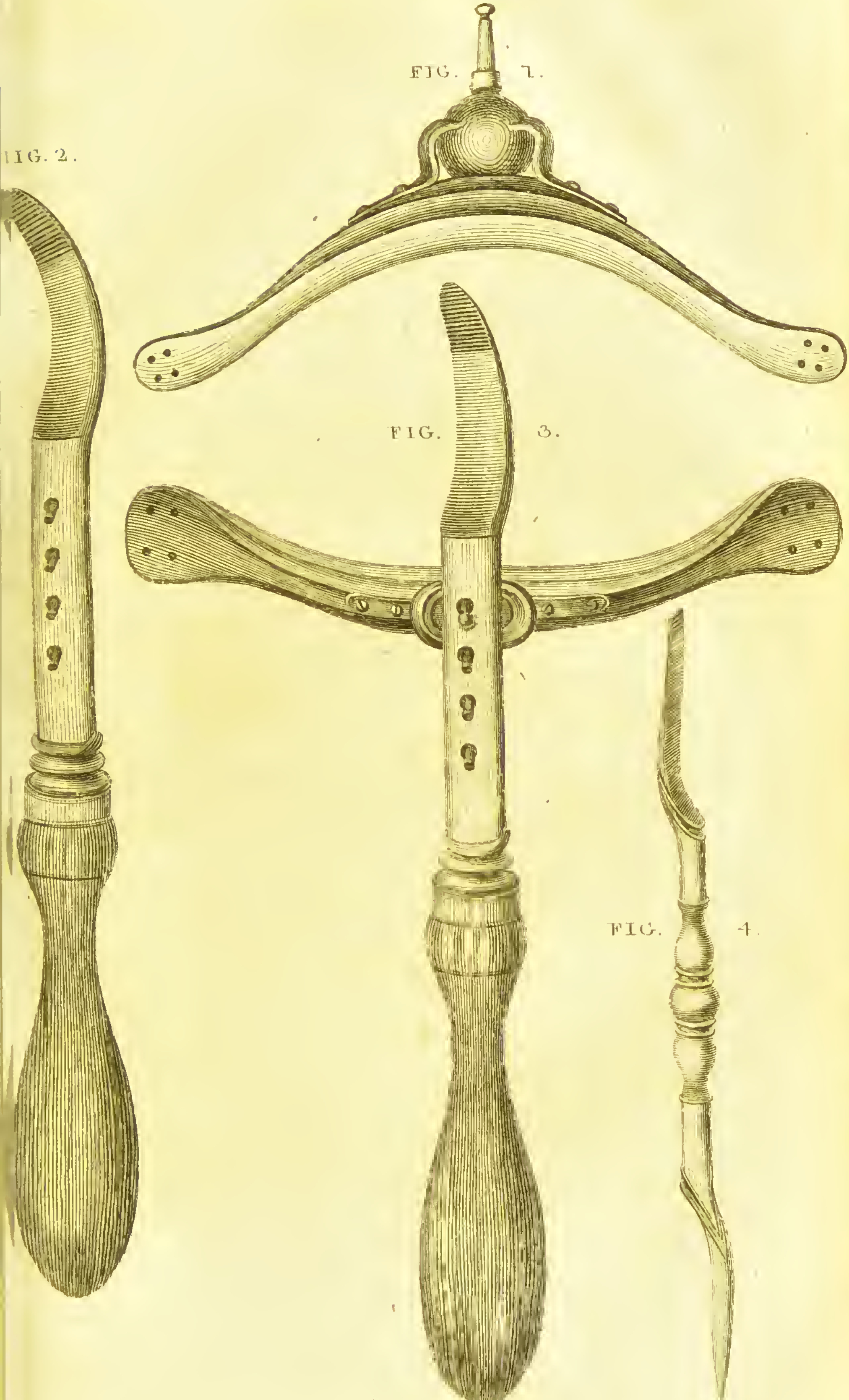

FIG. 1.

IG. 2.

FIG. 3.

FIG. 4.

D. Lizars Sculpt

eaſe from one part of the head to another. The inſtrument we have here repreſented is nearly the ſame with the levator of the celebrated Mr Petit of Paris.

As the great object of this operation is to remove the depreſſion of the ſkull, together with any other cauſe of compreſſion that may occur, we have taken different opportunities of pointing out the neceſſity of keeping this always in view. And for the ſame reaſon we think it here neceſſary to obſerve, that the utmoſt attention is requiſite on the part of the operator, to the raiſing or elevating of every part of the bone in which any degree of compreſſion is perceived: for if any portion of it ſhould be overlooked, and ſhould be allowed to continue to preſs upon the brain, little or no advantage will be derived from the reſt of the operation; the patient will continue in nearly the ſame degree of hazard; and after death the operator will be highly mortified to find, that by a little more attention, perhaps a valuable life might have been ſaved.

At the ſame time that care is thus taken to elevate the depreſſed pieces of bone, much attention is requiſite in the removal of any blood or ſerum from the ſurface of the dura mater: and if any ſharp-pointed inſtrument, pieces of ſtone, or any other extraneous body, have been any where forced in upon the brain, we need ſcarcely obſerve that theſe muſt likewiſe be removed; and this being effectually accompliſhed, the ſore muſt now be dreſſed, and the patient laid to reſt.

Much variety occurs in the directions given both by ancient and modern practitioners for the dreſſing of the ſores after this operation. With a view to preſerve the dura mater and brain from mortification, various antiſeptic applications have been recommended, and doſſils or ſyndons covered with theſe are deſired to be introduced, not merely into the perforation formed by the ſaw, but to be preſſed in between the ſkull and dura mater as far as this can be eaſily done. The impropriety, however, of this practice muſt at once appear obvious when we reflect upon the effects of it. The ſole object of the operation of the trepan is to remove compreſſion from the brain; now the dreſsings we have mentioned, namely, doſſils of lint crammed into the different perforations, muſt evidently have a conſiderable influence in counteracting this, not only by the preſſure directly produced by the introduction of them, but by their ſerving to prevent that free diſcharge of matter after the operation with which the ſafety of the patient is often very much connected. Inſtead of this the dreſſings ought to be of the mildeſt nature, and ſhould be as looſely applied as poſſible.—Dry lint is very commonly employed; but it proves much leſs irritating when thinly ſpread with any ſimple liniment of wax and oil; and no detriment enſues, as has been imagined by ſome, from the application of unctuous ſubſtances to the brain. No tent or doſſil ſhould be inſerted into the perforation; all that is neceſſary being to apply as lightly as poſſible over the ſore, a pledgit of ſoft lint ſpread with an ointment ſuch as we have mentioned; and this being covered with a compreſs of ſoft old linen, the whole ſhould be retained with a common night-cap made ſo as to tie below the chin, and to be either pinned or tied of a proper tightneſs, on the fore or back part of the head.—This ſupports the dreſſings with ſufficient firmneſs; and it neither keeps the head too tight, nor prevents a free flow of matter from the ſore, an inconvenience very apt to occur from the uſe of thoſe bandages which are commonly employed after this operation.

The patient, on being removed to bed, ſhould have his head placed in ſuch a manner as to prevent the ſore from being hurt; at the ſame time his poſition ſhould be ſuch as will moſt effectually contribute to the diſcharge of any matter that the ſore itſelf may afford, or of blood or ſerum that may ooze out from the ſurface of the dura mater.

When the ſymptoms under which the patient has laboured have proceeded entirely from a depreſſed portion of the ſkull, and when this depreſſion has been completely removed, it will very frequently happen, that ſome advantage will be immediately derived from the operation. From being perfectly torpid, with a deep laborious breathing, and a very conſiderable dilatation of the pupils, he will become leſs ſtupid and lethargic. He will begin to toſs himſelf about in bed—to raiſe his eye-lids—will make ſome feeble attempts to ſpeak: His breathing will be leſs oppreſſed, and the pupils will contract as they uſually do in health when expoſed to a ſtrong light.—But although all theſe favourable circumſtances ſhould not appear in any remarkable degree immediately after the operation, we are not to deſpair of its ſucceſs; for when the brain has been long compreſſed, we may readily ſuppoſe that it will not be able inſtantly to perform its various functions, even when the cauſe of the compreſſion has been very completely removed: and, beſides, it often happens, that together with a fracture and depreſſion of the ſkull, the brain has received a violent ſhock or concuſſion; in which caſe, as the ſymptoms do not depend entirely on the compreſſed ſtate of the brain, ſo we are not to expect them to be entirely removed on the cauſe producing this compreſſion being taken off. But by a due attention to the treatment of theſe ſymptoms, in the manner we ſhall afterwards point out, they will frequently diſappear in a ſlow and gradual manner, although no material alteration may be obſerved in them for a conſiderable time after the operation.

A ſurgeon ought not therefore to imagine that all his buſineſs is over when the operation is finiſhed; for this may be done in the moſt complete manner, and yet the patient will certainly ſuffer unleſs other means are employed for his relief: When the ſymptoms for which the trepan was applied are all evidently mitigated immediately on the depreſſion of the ſkull being removed, and if the patient in the courſe of a few hours is ſtill more remarkably relieved, there will be much cauſe to hope that he will do well without any other remedy being employed; and that quietneſs, keeping an open belly, and avoiding every cauſe of inflammation, will at laſt effect a complete cure: But when the contrary of this occurs, as is too frequently the caſe; and when the ſymptoms remain equally formidable after the operation as they were before, and eſpecially if they are not found to mitigate in the courſe of three or four hours after the patient is laid to reſt; remedies of a different kind are then to be adminiſtered.

As the ſymptoms which in ſuch circumſtances are moſt to be dreaded originate from two different cauſes, and as the choice of remedies to be employed for the removal of them, ought to be directed entirely by the nature of the cauſe which is found to ſubſiſt, much attention is neceſſary in diſcriminating them.

The cauſes I allude to, are, inflammation of the membranes of the brain, and concuſſion of the brain itſelf.

In general, the ſymptoms which prevail here are all ſuſpected to proceed from the ſame cauſe; they are ſuppoſed to be entirely of the ſame nature, and the ſame remedies are therefore employed for their removal. A little attention, however, would on many occaſions render the impropriety of this opinion evident: For although it frequently happens that the attendant ſymptoms are of a mixed nature, and depend ſo much upon a concurrence of both the cauſes we have mentioned, that they cannot be rightly diſtinguiſhed, yet in various inſtances it is otherwiſe; and whenever an evident diſtinction is perceptible, much advantage will accrue to the patient, from practitioners directing their attention to it.

After the operation of the trepan, and after all the evident cauſes of compreſſion have been removed, if the pulſe is found to be ſlow and ſoft, if the patient ſtill remains torpid and lethargic, and eſpecially if no contraction of the pupils is obſerved on the eye being expoſed to a ſtrong light, there will be much reaſon to apprehend that theſe ſymptoms depend in a great meaſure, if not entirely, on commotion or concuſſion of the ſubſtance of the brain: For although the ſymptoms we have juſt enumerated, are all ſuch as are very commonly induced by compreſſion of the brain; yet we know that they are likewiſe a very frequent conſequence of concuſſion: So that, when all the depreſſed bone and other obvious cauſes of compreſſion are removed, we conclude with much probability, that any ſymptoms which remain, when they are ſuch as we have mentioned, depend more upon concuſſion than on any other cauſe.

But when, inſtead of theſe ſymptoms, after the depreſſion of the ſkull and other cauſes producing a compreſſed ſtate of the brain are removed, there is, along with ſome return of ſenſibility, as indicated by the patient's becoming unmanageable and moving from one part of the bed to another, a firm, full, and ſomewhat quick pulſe, if the eye is found to be inflamed, and eſpecially if the pupil is obſerved to contract and the patient to withdraw his head on the eye being expoſed to much light, there will in ſuch circumſtances be much cauſe to ſuſpect that inflammation of the membranes of the brain has taken place. Indeed the dura mater, like every other membrane, is ſo ſuſceptible of inflammation, that it is difficult to imagine how any part of the ſkull can be beat in upon it with violence, without irritating and inflaming it in a very remarkable degree; and if once inflammation is induced upon any part of this membrane, we know from experience that it readily and quickly extends over the whole of it; a circumſtance which eaſily accounts for the high degree of inflammation, which in caſes of this kind is often obſerved in the eyes, as likewiſe for the contraction of the pupils, and for the evident uneaſineſs always produced by the expoſure of the eyes to much light.

When the bad ſymptoms which enſue from accidents of this kind are produced by an inflammatory ſtate of the parts, the pulſe, as we have ſaid, differs materially from the pulſe of a perſon ſuffering merely from concuſſion of the brain. From this laſt mentioned cauſe, the pulſe is full, ſlow, and ſoft; but when inflammation takes place, the pulſe, although frequently full, has a firmer ſtroke, and is commonly quick: And in this caſe, the breathing, although it is not oppreſſed and laborious as it frequently is in caſes of compreſſed brain, is always more frequent than natural; which is not commonly obſerved in patients labouring under the effects of concuſſion.

Although for the reaſons we have mentioned, it may often be difficult or even impoſſible to mark the exiſtence of theſe different ſets of ſymptoms, yet an attentive obſerver will frequently be able to diſtinguiſh them; and whenever this can be done, much advantage I think may be derived from it.

Practitioners of every age have recommended in injuries done to the head, to evacuate a good deal of blood; and there is much reaſon to think that no general rule was ever better founded: But from attentive obſervation of the effects of bloodletting in caſes of this nature, I have great cauſe to imagine that ſurgeons of modern times frequently carry it too far. In real inflammatory affections of the membranes of the brain, the propriety of diſcharging a great deal of blood is obvious, and will not be diſputed; but whenever there is reaſon from the ſymptoms to imagine, that they originate from concuſſion, bloodletting, if it is recommended at all, ſhould be practiſed with much caution.

Although the general ſtructure of the brain with reſpect to its figure, ſize, and other circumſtances, has long been well known; yet it muſt be confeſſed, that our anatomical knowledge of this organ is ſtill very deficient, nor do we underſtand with any kind of preciſion the manner in which it performs its various functions. Indeed our knowledge of this part of anatomy is ſo extremely lame, that we are frequently perfectly unable to diſcover by the moſt minute diſſection any difference between the brain in its ſoundeſt ſtate, and that ſtate of it in a perſon evidently killed by a fall or blow upon the head, and in whom all the ſymptoms induced by the accident were ſuch as indicated an affection of the brain alone. This, we muſt remark, is particularly the caſe in thoſe who die from what we term a Concuſſion or Commotion of the brain. In ſuch inſtances the brain we ſuppoſe to be ſomehow or other deranged; but it moſt frequently happens, that the moſt accurate diſſection after death, cannot diſcover the nature of this derangement.

From this it is obvious that the effect of concuſſions of the brain is not an excitement of inflammation; for even the moſt inconſiderable degree of inflammation is readily diſcovered by diſſection, and can ſcarcely indeed eſcape being noticed. Now, as it often happens that no appearance of inflammation in any part of the brain is diſcovered in thoſe whom we ſuppoſe to have died from concuſſion, it is not unfair to conclude, that the effects of theſe two

caufes,

cauſes, inflammation and concuſſion, are diſtinct, and perhaps very oppoſite in their tendency.

From the circumſtances we have mentioned of the effects obſerved upon diſſection to be produced by theſe cauſes, and of the ſymptoms induced by the one being different from thoſe which accompany the other, the concluſion we have formed with reſpect to their difference, might even upon theſe grounds be ſuppoſed to be well founded: But it is not upon ſpeculation alone, that I would wiſh to reſt either this, or any other opinion of much importance in practice. The idea was firſt ſuggeſted by the different effects which I had obſerved to proceed from blood-letting in affections of the brain from external injuries. In many inſtances, great and evident advantages were derived from it, while little or no benefit was procured from any other remedy: But in others, inſtead of any benefit reſulting from it, the patients became obviouſly worſe after every repetition of the operation: The pulſe, from being full, gradually became weaker; and the ſtrength of the patient commonly ſinking in the ſame proportion, he ſeldom recovered from the effects of blood-letting when practiſed to any conſiderable extent.

From theſe circumſtances I have been led to think, that concuſſion of the brain operates upon the general ſyſtem in nearly the ſame manner as ſyncope induced by fear, inanition, or any ſimilar cauſe, in the treatment of which blood-letting is known to prove hurtful.

In what manner a blow upon the head or a fall from a height, in a full habit of body, and in a perſon otherwiſe in perfect health, who only a few minutes before could have ſupported the loſs of much blood, ſhould be able inſtantly to induce ſuch a ſtate of the ſyſtem as cannot admit of any evacuation of this kind, I will not pretend to ſay: But that this is an occurrence which frequently happens, I am now from repeated obſervation convinced; and whoever will take the trouble of paying attention to this branch of practice, will find, that the opinion is by no means without foundation. He will find indeed, that all ſuch ſymptoms as originate from inflammation, are more effectually relieved by blood-letting than by any other remedy: But he will for certain obſerve, that all thoſe which do not depend upon this cauſe, and which ariſe ſolely from the effects of concuſſion, inſtead of being relieved by this remedy, will be uniformly rendered more violent and more alarming in proportion to the quantity of blood that is evacuated.

So far however as my experience goes, the evacuation produced by purgatives, never proves ſo debilitating as to render them improper; and as they have frequently a conſiderable influence in relieving the head in every affection of this nature, they ſhould never be omitted, and ſhould always be preſcribed in ſuch doſes, and theſe to be as frequently repeated, as the ſtrength of the patient may appear to render proper; but they ſhould never be carried ſo far as to run any riſk of inducing debility and languor.

In the following ſections, we ſhall have occaſion to enter into a more particular conſideration of the ſymptoms induced by inflammation of the membranes of the brain, and by concuſſion of the brain itſelf: But theſe general remarks upon the ſubject were neceſſary in this place, with a view to explain the nature of our practice in the treatment of thoſe ſymptoms which proceed from either of theſe cauſes when connected with a compreſſed ſtate of the brain, and when accordingly the operation of the trepan is not found to afford ſuch effectual relief as it otherwiſe would do. Poſtponing therefore a particular detail of the remedies to be uſed in caſes of inflammation or concuſſion of the brain, we ſhall now ſhortly remark, that whenever the operation of the trepan fails in relieving the ſymptoms for which it was employed, as this will give much cauſe to ſuſpect the exiſtence of one or other of theſe affections, much attention will be neceſſary in diſcriminating the real nature of them. When inflammation is found to take place, blood-letting, both general and local, will be requiſite, together with ſmart purgatives, mild ſudorifics, and a ſtrict attention to an antiphlogiſtic regimen: But when the ſymptoms are found to originate from concuſſion, the only evacuation that can with propriety be employed is gentle purging; for in this caſe, as we have already remarked, and as we ſhall afterwards endeavour more particularly to ſhow, blood-letting, inſtead of proving ſerviceable, very conſtantly does miſchief.

In both caſes, as well as in every affection requiring the operation of the trepan, the patient ſhould be kept perfectly quiet—little or no light ſhould be admitted to his apartment—any food he is able to take ſhould be of the mildeſt kind, and plenty of whey or of any diluent drink ſhould be allowed.

In the mean time, the ſtate of the wound ſhould be duly attended to; for after the operation of the trepan, the membranes of the brain are particularly liable not only to inflammation but to gangrene. In other parts of the body, we know that nothing ſo certainly prevents inflammation and gangrene, at the ſame time that it tends to mitigate their violence when preſent, as a free ſuppuration being induced upon the parts affected; and whoever will attempt a ſimilar practice in wounds of the head will find, that although, from the nature of the parts in which the affection is ſeated, it may not prove equally ſucceſsful, that it will however prove more ſo than any other mode of treatment hitherto employed.

With this view, warm emollient poultices and fomentations ſhould be applied over the dreſſings; and by taking care to renew them every two or three hours, it will commonly happen, that a plentiful flow of matter will take place from the perforations in the ſkull, by which any tenſion which occurred will ſoon be removed, at the ſame time that all the other ſymptoms will be rendered more moderate.

The dreſſings which are firſt applied after the operation, ſhould conſiſt, as we have ſaid, of the mildeſt articles, and applications of the ſame kind ſhould be continued during the cure. At each dreſſing, any matter that is formed on the ſurface of the ſore may be eaſily removed by a piece of ſoft ſpunge, or of lint, being introduced in a cautious manner into the perforations in the bone; and this being done, the ſore ſhould be covered as quickly as poſſible, with a pledgit of any mild emollient ointment.

When the cure goes properly on, after any ſloughs which have formed upon the ſurface of the ſores have ſeparated and fallen off, new granulations will appear upon the dura mater as well as upon all the reſt of the wound; and theſe continuing to advance, the different openings made by the trepan will at laſt be completely filled up, and the whole being brought as nearly as poſſible to a level with the reſt of the teguments, a cicatrix will in general be obtained by the ſame means that are found to prove ſucceſsful in other parts of the body, which we have elſewhere fully treated of *.

In various caſes, however, theſe granulations which in general ariſe from the dura mater only, although they have commonly been ſuppoſed to originate from the brain itſelf, inſtead of merely filling up the openings in the bone, puſh gradually out beyond the ſurface of the external teguments, ſo as to form diſtinct pendulous tumours.

Theſe tumours or excreſcences, when they arrive at any conſiderable bulk, prove ſometimes troubleſome, and various means have been propoſed for preventing or removing them. As they have commonly been conſidered as productions of the brain itſelf, much caution, and even timidity has prevailed in the treatment of them. Compreſſion is the means moſt frequently employed for removing them, or rather for preventing them. They are ſometimes kept down by different eſcharotics, and even by the ſtronger kinds of cauſtic.

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* Vide Treatiſe on Ulcers, &c.

ſtic. Some have propoſed to remove them by ligatures, and others by exciſion with the ſcalpel.

Of all theſe, the mode by compreſſion is moſt to be dreaded, and ought certainly to be avoided: For whether the tumours are productions of the brain or of the dura mater only, no preſſure can be applied to them without affecting the brain; and it very commonly happens, that even the ſlighteſt degree of it induces head-ach, ſickneſs, and in ſome inſtances even convulſions. We ſhould not therefore employ it in any caſe.

Theſe tumours are of various degrees of ſenſibility. In ſome inſtances, they are painful, and cannot bear to be touched; whilſt in others they appear to be nearly, if not altogether, inſenſible. In this laſt caſe, the moſt effectual kind of treatment is to prevent their riſing to any conſiderable height, by touching them frequently with lunar cauſtic: And in a few inſtances where the inſenſibility is great, and when the tumour hangs by a ſmall neck, a ligature may be applied to the root of it; and the nooſe being gradually tightened ſo as to deſtroy the circulation, it will commonly drop off in the ſpace of a few days. It ſeldom happens, however, that we are under the neceſſity of employing theſe or any other means for the removal of tumours of this kind; for in general they begin to diminiſh ſo ſoon as the ſoft granulations in the perforations of the ſkull begin to acquire a firmer conſiſtence, and by the time the oſſifying proceſs of this ſubſtance is completed they commonly drop off ſolely by the preſſure which is thus produced upon them. We ſhould not, therefore, in any caſe, proceed quickly to the removal of ſuch tumours; but whenever it is found that they do not fall off upon the different perforations being completely filled with bone, as the connection between them and the brain is then in a great meaſure cut off, they may accordingly be removed with more ſafety, either by exciſion, by cauſtic, or by ligature.

The cure being thus far completed, if

the method we mentioned was adopted, of ſaving all the ſkin and other teguments, a very narrow cicatrix only will remain, and the parts will be nearly as firm as they were before: But when much of the teguments have been deſtroyed, as there is never any regeneration of them, the bone is left covered by a thin cuticle only, with perhaps a very ſmall proportion of intermediate cellular ſubſtance; in which caſe a piece of tin or lead lined with flannel ſhould be fitted to the part, with a view to protect it from the effects of cold and other external injuries.

In injuries done to the head, when the ſymptoms which occur proceed entirely from a depreſſed portion of bone acting as a cauſe of compreſſion upon the brain; if this can be removed in the manner we have mentioned, a due perſeverance in the plan of management we have pointed out, will in general accompliſh a cure. It muſt be acknowledged, however, that accidents of this kind do not terminate in this favourable manner ſo frequently as we could wiſh; for, along with the depreſſion of the ſkull, it often happens, as we have ſaid, either that concuſſion of the brain takes place, or that there is a high degree of inflammation, with perhaps ſome tendency to gangrene; circumſtances which are always attended with danger, and the effects of which are always with much difficulty obviated.

We have already in a general manner pointed out the means beſt calculated for this purpoſe, and will afterwards have occaſion to treat of them more particularly: But in the firſt place we muſt proceed to conſider the other general cauſe of compreſſion of the brain, namely, extravaſation.

§ 2. *Of Compreſſion of the Brain from Extravaſation.*

By whatever cauſe compreſſion may be formed upon the brain, the ſymptoms which enſue from it are in general nearly the ſame; and as we have already entered into a minute conſideration of theſe, it will not now be neceſſary to enumerate them.

We ſhall only obſerve, that all the ſymptoms which depend upon a compreſſed ſtate of the brain, may be induced with as much certainty, will be of an equal degree of violence, and will be attended with as much hazard, from effuſions of blood, ſerum, or pus, as from the moſt extenſive depreſſions of the ſkull. In general, indeed, extravaſation within the ſkull is more to be dreaded even than depreſſions of great extent; for when a depreſſed piece of bone is of conſiderable ſize, the ſeat of the injury is at once pointed out, and by the uſe of proper means we frequently have it in our power to remove it; but in the caſe of extravaſation, our means of aſcertaining the ſeat of the injury being uncertain, ſo the effects of the remedies to be employed for the relief of the patient, are the leſs to be depended on. When indeed compreſſion of the brain is induced by a complication of theſe two cauſes, depreſſion of a portion of the ſkull, and extravaſation of blood or ſerum, the ſeat of the one is readily diſcovered by that of the other; but when it depends ſolely upon extravaſation, it is always difficult, and on many occaſions impoſſible, to diſcover the ſeat of it.

A complication of the two cauſes we have mentioned is far from being an uncommon occurrence: for it happens moſt frequently, that every caſe of a depreſſed portion of the ſkull, is accompanied with extravaſation to a greater or leſſer extent; but inſtances are likewiſe met with, of effuſions of blood and of ſerum from external injuries, without any appearance either of fracture or depreſſion.

We have already treated fully of the indications of cure in compreſſion of the brain from a depreſſed portion of the ſkull: The ſame indications are applicable in caſes of compreſſion from extravaſation.

After endeavouring to aſcertain the ſeat of the injury, we are to make one or more perforations through the bone, in order to evacuate the collected fluid; and this being done, we are to guard againſt any effects which otherwiſe the accident might in future produce upon the brain and its membranes.

In caſes of extravaſation it ſometimes happens, that the part in which the collection is ſeated, is pointed out by the mark of a blow upon ſome part of the head; and on the bone being laid bare, a fiſſure will in ſome inſtances be found in it, while in others no apparent injury is done to it, farther than a ſeparation perhaps of the pericranium from the ſurface of the bone, altho' even this does not always take place.

When any of theſe circumſtances however occur, we ſhould conſider the ſeat of the injury to be ſo far determined as to have no heſitation in fixing upon this ſpot for applying the trepan. Wherever there is an external mark of injury, although we cannot with certainty conclude that any effuſion which occurs upon the brain, will correſpond exactly to it, yet it will more probably be met with at this place than in any other, and therefore the inſtrument ſhould be applied directly upon the centre of it.

But it often happens, that no external mark is to be met with to lead to the ſeat of the injury; even after the whole head is ſhaved, and examined with the moſt minute attention, the ſkin will in various inſtances be found perfectly ſound, without any appearance either of tumour or diſcoloration. A patient, in ſuch circumſtances, we ſuppoſe to be in great hazard, from the brain being compreſſed in one part or another: unleſs this compreſſion be removed by an operation, he muſt in all probability die; in what manner then is a practitioner to conduct himſelf? The ſituation is truly diſtreſſing; but ſtill, in my opinion, there ſhould be no heſitation as to the line of conduct a ſurgeon ought to purſue, which ſhould be quite the reverſe of what is almoſt univerſally adopted.

It has hitherto been held as an eſtabliſhed maxim, never to apply the trepan, in compreſſion of the brain from external violence, where no external mark occurs to point out the ſeat of the injury, becauſe the reſult of the operation is in ſuch caſes un-

uncertain: But as compreſſion of the brain, if it is not removed, muſt ſoon terminate in the death of the patient; and as it cannot be removed by any other means than by perforating the ſkull; in ſuch circumſtances, to leave any thing undone which would give even the ſmalleſt chance of ſaving the patient, ſhows a degree of indifference which is not in any other inſtance to be met with in the ſurgery of modern times. It is with truth indeed ſaid, when no external mark of injury appears, that there muſt always be much uncertainty whether any perforation we may make will fall exactly upon the cauſe producing the compreſſion; and that as the ſymptoms induced by a concuſſion of the brain, are in many inſtances extremely ſimilar to thoſe which depend upon compreſſion, much dubiety muſt occur from our frequently not being able to ſay with preciſion, whether the ſymptoms which prevail depend upon one cauſe or the other; and it muſt be confeſſed, that in many inſtances, where the ſymptoms have previouſly been ſuſpected to depend upon compreſſion of the brain, that, on diſſection, no veſtige has been met with, either of depreſſion of the ſkull, or of effuſion of blood or ſerum.

All this I ſhall readily admit; but what does it amount to? Why, to no more than this: That where a patient is evidently in much danger, and is certainly to die if means are not employed by art for his relief; wherever there is much uncertainty in the effects of theſe means, that it will be better not to put them in practice, but rather to leave the patient to his fate! So long as a patient is in ſuch a ſituation as can afford a ray of hope that he may recover by other means, it would no doubt be improper to employ the trepan; or if much additional riſk was to be incurred by this operation, no practitioner of character, would think of adviſing it with ſo ſmall a probability of any advantage being to be derived from it.

But as a patient labouring under ſymptoms ſuch as we are now deſcribing, which cannot be relieved by any other means, muſt evidently be in very imminent danger, and in ſuch deſperate circumſtances as no additional hazard can be incurred from an operation, we ought certainly, in juſtice to the patient, to his friends, and to our own characters, to put it in practice. The chance reſulting from it, we acknowledge, will not be great: But as it is the only means from whence ſafety can be expected; by employing it, lives may be ſaved which otherwiſe would inevitably be loſt; and if a prognoſis ſufficiently guarded be given, which ought always to be done, no juſt blame could fall either upon the operator, or upon the art in general. If the friends of a patient in this dangerous ſituation, ſhould be told of the hazard he is in; that there is an operation by which he may have a ſmall chance of recovering, but that this chance is by no means conſiderable; even under ſuch an uncertain prognoſis the operation would in moſt inſtances be ſubmitted to; and however unſucceſsful it might prove, and although no extravaſation, or other cauſe of a compreſſed brain, ſhould be met with, ſuch a prognoſis as we have mentioned, would in every inſtance ſcreen the operator from blame; and having thus done all that could afford even the leaſt poſſibility of a recovery, the friends of the patient, as well as the ſurgeon himſelf, would ſurely have more cauſe of comfort than if no attempt had been made for this purpoſe.

We ſhall ſuppoſe therefore, for the reaſons now mentioned, that the trepan is to be applied on account of ſymptoms which accompany a compreſſed ſtate of the brain; but where no external mark indicates the particular ſeat of the injury, it may be aſked in what manner is an operator to proceed? As the cauſe producing the compreſſion may exiſt juſt as readily in one part of the brain as in another, it may appear to be a matter of little importance in what part of the head the firſt perforation is made. This, however, is far from being the caſe: For as we are ſuppoſing the compreſſion to be induced by blood or ſerum, and as theſe, while in a fluid ſtate, are always paſſing as much towards the baſis of the brain, as the intimate connection between the dura mater and the internal ſurface of the ſkull will allow; it will be proper to form the firſt perforation in the moſt inferior part of the cranium in which it can with any propriety be made, and to proceed to perforate every acceſſible part of the ſkull, till the cauſe of the compreſſion is diſcovered. For this purpoſe there is no neceſſity, as we have already obſerved, to remove any part of the integuments: Wherever it is intended to perforate the bone, if an inciſion is made through the ſkin, muſcles, and pericranium, immediately above it, they will always retract ſufficiently for admitting the inſtrument; and this being all that is neceſſary, more ſhould not be deſired. If we are at laſt ſo fortunate as to meet with a quantity either of effuſed blood, or of ſerum, which in ſome inſtances is alone poured out, much care ſhould be taken to diſcharge the whole of it; for which purpoſe, as blood, when coagulated, frequently adheres firmly to the dura mater, inſtead of one perforation, two, three, or more ſhould be made at this part, ſo as to admit of all the blood that is extravaſated being effectually taken away.

But the operator in ſuch circumſtances ſhould likewiſe recollect, that the blood, inſtead of being effuſed on the ſurface of the dura mater, may be collected within the cavity of that membrane; or it may even be contained within the pia mater, in immediate contact with the ſurface of the brain: For which reaſon the ſtate of the dura mater ſhould be examined with much attention after every perforation. If this membrane is found to be of its natural colour, and not more tenſe upon preſſure than it ought to be, nothing farther will be neceſſary; but if it is very tenſe and elaſtic, and eſpecially if it has that dark or livid appearance which indicates the probability of blood being collected underneath, it ought undoubtedly to be opened in order to diſcharge it. The beſt and eaſieſt mode of effecting this is to ſcratch a ſmall hole by repeated ſtrokes either of a lancet or of a ſmall ſcalpel; and this being done, and the point of a pair of ſciſſars with a ſlight curve being introduced within the dura mater, the opening may thus be enlarged to the full extent of the perforation in the bone; or if one inciſion acroſs the perforation is not found to be ſufficient for evacuating the blood below, a crucial inciſion may be made, and if neceſſary the corners thus produced may be entirely cut off.

Although we would not by any means recommend the diviſion of the dura mater were it not neceſſary for the ſafety of the patient; yet in every inſtance where the operation of the trepan is adviſable, if on perforating the bone there is reaſon to ſuſpect that any fluid is collected either between this membrane and the pia mater, or even below the pia mater itſelf, as the intention of the operation would not otherwiſe be fulfilled, the collection, of whatever it may conſiſt, ought immediately

ately to be opened: In ſuch circumſtances, unleſs we go this length, we in fact do nothing; for the dura mater is ſo thick and ſtrong, that any blood or matter collected beneath would more readily ſpread inwards upon the brain, than burſt out through the different layers of this membrane.

It has been objected to this practice, that very few have recovered by it; that there is a conſiderable riſk of hæmorrhagies being induced which may prove fatal; and that the brain is very apt to protrude at the perforation in the bone after is has loſt the ſupport of its ſurrounding membranes.

That few have recovered by this means, I will readily allow: But this does not proceed from the opening made in the dura mater, or from its being particularly hazardous of itſelf; but from the cauſe for which it is employed, being commonly attended with ſuch real danger as puts it out of the power of art either by this or any other means to obviate the fatal effects of it.

With reſpect to hæmorrhagies being apt

to enſue from this practice: Although I have ſeen the dura mater opened in ſeveral inſtances by others, and have different times done it myſelf, I never knew an inſtance of any danger ariſing from it, not even when any of the ſinuſes have accidentally been laid open; and although the brain will no doubt protrude more readily when the dura mater is divided, than it otherwiſe would have done, yet this we know is an occurrence which very frequently happens in every wound where much of the cranium is removed, and that conſiderable portions of the brain have been even diſcharged by wounds of this kind, without any apparent inconvenience enſuing.

The reſult therefore of all that has been ſaid upon this point, is, that where the intention of the operation is fully anſwered merely by perforating the cranium; where any portion of bone that has been depreſſed is thus completely removed, or where any preſſure produced upon the brain is found to proceed from blood or ſerum extravaſated on the ſurface of the dura mater; as in any of theſe caſes the cauſe of the patient's danger can be removed without penetrating this membrane, it ought not by any means to be injured: But whenever the bad ſymptoms which have prevailed are not relieved by the perforation of the bone, or by the removal of any effuſed fluid that may be met with on the dura mater, and when from the appearance of this membrane there is reaſon to ſuſpect that any fluid is collected beneath, it ought undoubtedly to be opened in the manner we have mentioned. Even although the inconveniences reſulting from it were much greater than they have ever proved to be, when the patient's life is in all probability to depend upon it, ſomething ought to be hazarded: But we have ſeen that the riſk attending this part of the operation is by no means great; ſo that whenever it is in any degree neceſſary, I ſhould conſider any practitioner as culpable who ſhould omit it.

In this ſituation our ideas ſhould be exactly ſuch as we are directed by in the treatment of abſceſſes in other parts of the body. When a patient is ſuffering with matter collected in a particular part, no ſurgeon of experience will be deterred from going to the full depth of the collection merely from finding that it is more thickly covered than he had reaſon to expect before the ſkin and cellular ſubſtance were divided. He will proceed more ſlowly and with much caution; but he will at laſt reach the ſeat of the diſorder with as much certainty as if it had been much more ſuperficial.

In like manner, when there is reaſon to imagine that matter is collected beneath the membranes of the brain, an inciſion ſhould for certain be made through them. No additional riſk can be incurred from this: Some few patients may be ſaved by it; and at any rate, it muſt always afford ſome ſatisfaction, not only to the friends of the patient, but to the practitioner himſelf, to think that nothing has been omitted from whence any advantage could probably be derived.

It will often happen, indeed, that neither this, nor any other effort of art, will obviate the danger of the patient. But when the principles upon which an operation is founded are evidently juſt, and when it appears upon mature deliberation, that a patient may be ſaved by it, and that he cannot eſcape by any other means; it is not the frequency of its ſucceſs alone by which we are to be directed: The danger induced by the cauſe for which it is employed is the object we are to keep in view; and every practitioner who acts ſolely for the good of his patient, will at all times employ ſuch means as are beſt calculated for the removal of this danger, without paying attention to any other conſideration. If it were to be the object of ſurgery to operate only where certain ſucceſs was to enſue, many lives would be loſt that otherwiſe are ſaved; and in that caſe the practice we have now recommended, of applying the trepan in injuries done to the brain without ſome external mark to be directed by, would no doubt be altogether inadmiſſible: But as the ſafety of thoſe intruſted to us ought to be our firſt and great object, and profeſſional fame only a ſecondary conſideration, whenever we are certain that death muſt enſue, if not prevented by the timely application of a proper remedy, although there may be very little certainty of this remedy proving ſucceſsful, yet if it is the only means from whence there is any chance of ſafety, it ought undoubtedly to be employed. It is on this principle ſolely that we have adviſed the practice of perforating the ſkull in different places, when in caſes of compreſſed brain the part chiefly affected is not pointed out by ſome external mark of injury: And although the opinion we have thus ventured to give is not agreeable to general practice, yet as this practice has ancient cuſtom only for its ſupport, being in every other reſpect apparently ill-founded, the advantages which may accrue from a different mode of treatment, will only require, we think, to be thus fully pointed out in order to procure it a favourable reception.

Prejudice ariſing from and ſupported by ancient authorities, will here, as in moſt caſes, have ſome effect in preventing a new propoſal from being at firſt attended to: but we think it probable, that no great length of time will be required to place it in a more favourable point of view.

Having already pointed out the plan of management to be adopted in the after-treatment of thoſe in whom the trepan has been applied for the removal of a depreſſed portion of the ſkull, it will not again be neceſſary to enter upon the ſubject; for whatever the cauſe may be for which the operation is practiſed, the cure of the remaining ſore muſt always be conducted in the ſame manner.

Having thus attended to the cauſes by which a compreſſed ſtate of the brain may be induced, we ſhall now proceed to the conſideration of commotion or concuſſion.

SECTION IV.

Of Concuſſion or Commotion of the Brain.

EVERY affection of the head attended with ſtupefaction, when it appears as the immediate conſequence of external violence, and when no external mark of injury is diſcovered, is in general ſuppoſed to proceed from commotion or concuſſion of the brain; by which is meant ſuch a derangement of this organ as obſtructs its natural and uſual exertions, but which does not leave ſuch marks of its exiſtence behind it as to render it capable of having its real nature aſcertained by diſſection.

Almoſt all the ſymptoms commonly produced by a compreſſed ſtate of the brain, as enumerated in the third ſection, are in ſome inſtances found to occur from concuſſion: but thoſe which are moſt frequently induced by this cauſe are, Stupefaction; torpor to a greater or leſſer degree;

a ſlow, ſoft pulſe; and a dilated ſtate of the pupils, even on the eyes being expoſed to a ſtrong light.

As it is not always eaſy, however, to determine from the ſymptoms which prevail what particular affection of the head may have taken place in conſequence of external violence, we ſhall endeavour to mark as far as may be done a diſtinction between concuſſion and inflammation, and betwixt concuſſion and compreſſion, of the brain. This is an object of much importance, and requires our moſt ſerious attention.

There is not much difficulty, as we have ſeen in the laſt ſection, of diſtinguiſhing between thoſe ſymptoms which proceed from inflammation, and thoſe which originate from concuſſion.—Such as proceed from concuſſion alone, commence immediately on the cauſe being inflicted; in the more violent degrees of them, the patient remains totally inſenſible; the pupils are much dilated, and do not contract even when the eyes are expoſed to the ſtrongeſt light; and the pulſe, although ſometimes full, is not hard nor ſtrong, and it always becomes weaker on blood being evacuated.

Thoſe ſymptoms again which originate from inflammation, ſeldom appear till a conſiderable time after the accident: By the deſcription we ſhall give more particularly of them in the following ſection, it will appear, that they are materially different from thoſe which occur either from a compreſſed ſtate of the brain or from concuſſion; and in particular, that the pupils are not dilated; that the eyes, excepting in the more advanced ſtages of the diſeaſe, are very ſenſible to the impreſſion of light; and that the pulſe is firm and hard from the firſt, and does not become weaker on moderate evacuations of blood.

By theſe marks of diſtinction, as well as by other differences which an attentive practitioner may commonly notice, little uncertainty will ever prevail in determining whether the ſymptoms which take place depend upon concuſſion or inflammation; ſo that with reſpect to this point we may ſoon determine the mode of practice to be purſued. And again, we can eaſily diſtinguiſh ſlight caſes of concuſſion, from thoſe ſymptoms which proceed from compreſſion. Thus, when a perſon is knocked down by a blow upon the head, and quickly recovers from the more alarming effects of it, but remains for a conſiderable time giddy; with ſlight pains in different parts of his head; with tinnitus aurium; weakneſs of ſight; ſome degree of imbecillity, and loſs of memory; if no other ſymptoms occur, and eſpecially if the patient is able to walk about, as frequently happens even in the higheſt degree of the ſymptoms we have mentioned; we conclude from experience in ſimilar caſes, that they all proceed from commotion or concuſſion, and not from compreſſion of the brain; for the ſymptoms which proceed from compreſſion are always of a more permanent nature, and uniformly continue till the cauſe which produced them is removed.

But in every accident of this kind attended from the beginning with more violent ſymptoms, and eſpecially when the patient is rendered altogether inſenſible, if no external mark of injury is met with, there is always much difficulty in determining whether the ſymptoms which take place depend upon concuſſion or depreſſion. Even the moſt experienced ſurgeons are frequently unable to determine upon this point with any kind of certainty. Indeed inſtances muſt have occurred to every practitioner, in which ſymptoms which were ſuppoſed to originate ſolely from concuſſion, have after death been found to proceed from extravaſation, or perhaps from a fracture attended with depreſſion of the ſkull which had not been previouſly detected. And again, extravaſation has in various caſes been ſuſpected to produce ſymptoms, when on diſſection no veſtige either of this or of any other morbid appearance could be diſcovered.

So far as my obſervation goes, the moſt

material difference which occurs between the ſymptoms produced by theſe two cauſes, concuſſion and compreſſion of the brain, is met with in the pulſe and in the breathing. In a compreſſed ſtate of the brain the breathing is commonly deep and oppreſſed, ſimilar to what moſt frequently takes place in apoplexy; whereas, in patients labouring under commotion or concuſſion, the breathing is in general free and eaſy, and the patient lies as if he was in a ſound and natural ſleep. The pulſe is commonly ſoft and equal, and not irregular and ſlow, as it is uſually found to be when the brain is compreſſed. In caſes of compreſſed brain too, although little or perhaps no relief may be obtained from blood-letting, yet no harm is obſerved to occur from it; for in ſuch circumſtances it may be preſcribed in moderate quantities, without reducing either the frequency or ſtrength of the pulſe: Whereas in real concuſſion of the brain, the pulſe, as we have already remarked, will frequently ſink, and become much more feeble on the diſcharge of only eight or ten ounces of blood.

In doubtful caſes, therefore, a quantity of blood ſhould be immediately diſcharged: If the pulſe, upon ſix or eight ounces being taken away, is found to be ſtronger and fuller than before; if the blood appears to be ſizy; and eſpecially if the patient becomes in any degree more ſenſible; we may conclude with much probability, that the ſymptoms which take place depend either upon extravaſation; upon a depreſſion of ſome part of the ſkull which has not been diſcovered; or upon ſome degree of inflammation: and ſo long as the pulſe remains firm, or ſo long as any advantages are gained by it, we may with ſafety proceed to evacuate more blood.

But when the pulſe, upon a few ounces of blood being diſcharged, becomes feeble, and eſpecially if the patient becomes in other reſpects more weakly, as will almoſt always be the caſe when the ſymptoms depend moſtly upon concuſſion, as the nature of the caſe is thus rendered in ſome meaſure certain, any farther evacuation of blood ſhould be immediately deſiſted from.

We have already endeavoured to ſhow, that concuſſion of the brain appears to operate by inducing debility of the whole nervous ſyſtem; our remedies, therefore, inſtead of tending to increaſe this, as bloodletting very certainly does, ſhould be directed with a view to ſupport and ſtrengthen the patient.

With this intention, in any other ſet of ſymptoms depending on debility, we would adminiſter not only invigorating cordials internally, but would make uſe of ſtimulating applications outwardly; and as the ſymptoms of debility are as ſtrongly marked in the caſe of which we are now treating as in any diſeaſe whatever, I am clear that cordials, and even ſtimulants, are equally neceſſary in the treatment of it.

Many practitioners have acknowledged, that although they have by general cuſtom been induced to bleed freely in every caſe of injury done to the head, yet in many inſtances that no evident advantage has been derived from it, and in ſome that it has even appeared to do miſchief. Having met with various inſtances of this, in which large evacuations of blood ſunk the ſtrength of the patient in the moſt alarming manner; and finding, indeed, unleſs where the ſymptoms were obviouſly of an inflammatory nature, that few, if any, recovered when the practice of diſcharging much blood was carried as far as is uſually done; I was induced in the firſt place to ſee what would be the event of making no evacuation of blood, but merely to truſt to the effects of laxatives, and to a gentle moiſture being kept upon the ſkin. Upon finding that no bad effects reſulted from this, but on the contrary, that more patients recovered than had commonly done when a contrary practice was purſued, I was led to go ſomewhat farther in the proſecution of the ſame idea.

Upon this principle cordials were given internally, and ſtimulants, particularly bliſters, applied externally, in the ſame manner as is uſually done in caſes of debility proceeding from any other cauſe; and hitherto the effects reſulting from this have been ſuch as ſufficiently warrant a continuance of the practice.

In every caſe, therefore, where concuſſion of the brain is found to be the cauſe of the ſymptoms which prevail, the practice I would wiſh to recommend is, to exhibit in a gradual manner ſuch quantities of warm wine as we would judge to be proper for the ſame ſymptoms of debility induced by any other cauſe: As patients in ſuch circumſtances are apt to become cold, they ſhould be kept warm by proper coverings: A bliſter ſhould be applied over all that part of the head in which the ſkin has not been injured; ſinopiſms ſhould be applied to the feet; and although ſtrong purgatives would be improper, by tending to reduce the ſtrength of the patient, yet gentle laxatives prove always uſeful, and ſhould be regularly given ſo as to keep the bowels moderately open.

As wine is a cordial upon which we can

place more dependence than on any other with which we are acquainted, it ought in this, as in every caſe where cordials are neceſſary, to be preferred: But although with due pains, by opening the patient's mouth, and putting it in with a ſpoon, it may in almoſt every caſe be exhibited; yet we now and then meet with inſtances in which it cannot be ſwallowed in ſuch quantities as to have much effect: In this caſe the volatile alkali, ardent ſpirits, and other cordials of a ſtimulating kind, ſhould be given.

In concuſſions of the brain, Mr Bromefield has recommended the uſe of opiates; a circumſtance which tends much to corroborate the idea we have endeavoured to eſtabliſh of the nature of this affection, for few medicines act with more certainty as cordials than opium: when conjoined with antimonials, I have frequently found it prove ſerviceable; but although I have upon ſuch reſpectable authority employed opium by itſelf, I have not hitherto found it to prove ſo uſeful as wine: This, however, may proceed, either from my not having puſhed the uſe of it ſo far as I ought to have done; or from the few caſes in which I have employed it having been ſuch as would not have done well whatever remedy might have been uſed. I muſt, therefore, have farther experience of its effects before venturing to ſpeak deciſively about it.

In caſes of this nature iſſues are commonly adviſed; but as more advantage I believe is to be derived from the ſtimulating powers of bliſters, than from any diſcharge which they produce, inſtead of preſerving a part that has been bliſtered open, by means of iſſue-ointment, as is uſually done, I would rather prefer a repeated and frequent renewal of bliſters on different parts of the head and neck. By this means, if any advantage is to be derived from drains, it will be received with as much certainty as from any kind of iſſue; and by applying one bliſter always as another is nearly healed, almoſt a conſtant ſtimulus will be preſerved.

When patients are recovering from accidents of this kind, a liberal uſe of the bark, with ſteel mineral waters, has ſometimes proved ſerviceable: Gentle emetics have likewiſe proved uſeful; and in ſeveral inſtances, when from ſhocks given to the brain, much languor, inactivity, and loſs of memory, have continued more permanent than uſual, electricity has been productive of goods effects.

It muſt be remembered, however, when we recommend ſuch a courſe, that it is expreſsly for the purpoſe of removing ſymptoms which originate ſolely from concuſſion, and which do not depend in any degree either upon a compreſſed ſtate of the brain or upon inflammation: A circumſtance which we ſuppoſe may be in general ſo far aſcertained, as to render it obvious whether ſuch a courſe be proper or not, merely by the effects obſerved to reſult from blood-letting. Attentive obſervation of other circumſtances might in ſome inſtances enable us to determine this point without the neceſſity of having recourſe to this means of diſtinction; but where there is ſuch room for uncertainty as frequently prevails here, and where the life of a patient is to depend in a great meaſure on the practice to be adopted, nothing ſhould be omitted that can have any effect in eſtabliſhing an accurate knowledge of his ſituation. In ſuch circumſtances, therefore, there is no room to heſitate; and we ſhould always diſcharge as much blood in the manner we have mentioned, as is fully ſufficient for determining the nature of the caſe.

This is the practice upon which we would wiſh to depend, when the ſymptoms which prevail ariſe from concuſſion alone: And accordingly we have not thought it neceſſary to mention the uſe of the trepan; for although this operation is very univerſally employed in every caſe of this nature, yet unleſs where ſymptoms take place of a compreſſed ſtate of the brain, no good reaſon can be given for it. But when any kind of doubt remains upon this point, and eſpecially when a patient continues in a ſtate of inſenſibility, the trepan ought by all means to be employed; for as in theſe circumſtances the danger could not probably be increaſed by it, even although the ſymptoms ſhould afterwards be found to originate from concuſſion; and as it affords the only chance of ſafety on the ſuppoſition of their depending upon compreſſion, practitioners would be highly blameable were they to omit it: And as the hazard of the patient muſt here be extremely great, perforations ſhould be made in every acceſſible part of the ſkull ſo long as the cauſe remains undiſcovered.

We now proceed to conſider more particularly the effects of inflammation upon the brain.

SECTION V.

Of Inflammation of the Membranes of the Brain from external Violence.

INFLAMMATION in any part of the body always demands our attention, and more eſpecially when it occurs in an organ of importance; for as its effects are in general violent and rapid, if they are not ſoon obviated they are in a ſhort ſpace of time commonly productive of miſchief which cannot afterwards be removed.—If this is the caſe in parts of leſs importance, it is more particularly ſo in every inflammatory affection of the brain.

Inflammation of the brain and of its membranes is attended with all the ſymptoms which commonly occur in inflammatory affections of other parts, and is at the ſame time accompanied with ſymptoms peculiar to itſelf. By whatever cauſe it may be induced, the ſymptoms do not appear immediately; ſeldom indeed till ſeveral days after the injury is inflicted, and in many caſes not till two, three, or more weeks, or even as many months have elapſed; a circumſtance, we muſt obſerve, which ſerves more certainly than any other to diſtinguiſh an inflammatory affection of the brain, and of its membranes, from every other ailment to which it is liable from external violence; for the conſequences of concuſſion of the brain take place immediately upon the injury which produces them being done; and this is likewiſe the caſe with theſe ſymptoms which depend either upon a depreſſion of the ſkull, or upon an extravaſation of blood or of ſerum.

At ſome uncertain interval of two or three days, of as many weeks, or of months, as has been the caſe in ſome inſtances, from the time that the injury which occaſions the inflammation has been received, the patient begins to feel an univerſal uneaſineſs over his head, attended with liſtleſſneſs and ſome degree of pain in the part upon which the injury was inflicted,

flicted, but of which perhaps he has not till now had any cauſe to complain.

The liſtleſſneſs gradually increaſes, the patient appears dull and ſtupid, and the pain becomes more ſevere in the part at firſt injured; while the diſtreſs in the other parts of the head gives a ſenſation of fullneſs as if the brain was girded or compreſſed: The patient complains of giddineſs and of nauſea; which ſometimes terminates in vomiting. He finds himſelf hot and extremely uneaſy; his ſleep is much diſturbed, and he is not refreſhed either by what he enjoys naturally, or by what is procured with opiates. The pulſe is firm, or rather hard and quick, as it is almoſt always indeed in inflammatory affections of membranous parts: The face is commonly fluſhed, the eyes are from the beginning ſomewhat inflamed, and expoſure to light creates a good deal of pain.

In ſome inſtances, where the attending ſymptoms are accompanied with a wound of any part of the head, this fluſhing of the face and inflammation of the eyes are at-

attended with and ſeem to depend upon an eriſipelatous affection proceeding from the ſore: In which caſe the edges of the ſore firſt become hard and tumefied, and the ſwelling, which appears to originate in the apaneurotic expanſion of the muſcles of the head, ſpreads very quickly over the whole of it, and eſpecially over the fore-part towards the eye-lids; which in many caſes of this kind become ſwelled to ſuch a degree as to ſhut up the eyes entirely. This ſwelling is ſomewhat ſoft; receives with eaſe any preſſure that is made upon it; is painful to the touch, and the ſkin over the whole of it has an eriſipelatous appearance. This diffuſed ſwelling, however, although formidable in appearance to thoſe not much accuſtomed to this branch of practice, is not in general of ſuch a dangerous tendency as that puffy circumſcribed tumour to which the parts on which the blow was given are more eſpecially liable; for it frequently happens that this eriſipelatous ſwelling which extends over almoſt the whole head, originates,

nates, not from any thing bad within the ſkull, but merely from the external wound in the tendons of the different muſcles: In which caſe all the ſymptoms with which it is attended are very commonly eaſily removed by thoſe means which in general prove moſt effectual for eriſipelas in other parts: In a few inſtances, however, this ſymptom is likewiſe connected with, and ſeems to originate from, ſome affection of the dura mater; in which caſe its tendency is always of the moſt dangerous nature, and therefore requires our moſt ſerious attention.

In the courſe of a day or two from the time that theſe ſymptoms become formidable, the part which received the blow begins to aſſume ſome appearances of diſeaſe. If the bone was laid bare by the original accident, it is now obſerved to loſe its natural healthy complexion; to become pale, white, and dry, either over its whole ſurface, or in particular ſpots, which by degrees extend over the whole; and the edges of the ſore, from the firſt commencement of the bad ſymptoms, become hard, dry, painful, and conſiderably ſwelled: But when the bone has not been denuded, and when none of the ſofter parts have been divided, but merely contuſed, they now begin to ſwell, become puffy, ſomewhat painful to the touch, and if the head be ſhaved, the ſkin over the parts affected will be obſerved to be of a more deep red than in the reſt of the head; and if the ſwelled part be now laid open, the pericranium will in all probability be found to be detached from the ſkull, and a ſmall quantity of a thin, bloody, and ſomewhat fetid ichor, will be found between this membrane and the bone; and the bone itſelf will be diſcoloured in nearly the ſame manner as if it had been laid bare from the beginning.

By the application of proper means, all theſe ſymptoms are in many inſtances removed; but when they are either neglected from the beginning, or when they do not yield to the remedies employed, they are very conſtantly aggravated. The pulſe ſtill continues quick and hard; the patient becomes more and more reſtleſs; in ſome inſtances, delirium takes place. He is in general extremely hot, but at times is ſeized with ſlight ſhiverings, which gradually become not only more ſevere but more frequent, and are very commonly attended with ſome degree of coma or ſtupor.

About this period all the ſymptoms which we have deſcribed become ſo much milder as not to be diſtinctly obſerved, or are altogether loſt in thoſe which now begin to take place.—Paralyſis of one ſide or the other is ſoon followed by deep coma; the pupils are dilated, and are ſcarcely affected by the impreſſion of light; the urine and fæces are paſſed involuntarily; ſubſultus tendinum and other convulſive ſymptoms take place; and death is the certain conſequence of this ſituation if the patient is not ſpeedily relieved.

We have thus enumerated the ſymptoms which uſually occur from inflammation of the membranes of the brain: Others which we have not mentioned may be met with in particular inſtances; but thoſe we have narrated occur moſt frequently, and they ſerve to mark the preſence of the diſeaſe with ſufficient preciſion.

Attentive obſervation will readily diſtinguiſh two ſets of ſymptoms in thoſe we have mentioned; each of which is connected with and clearly points out a particular ſtate or ſtage of the diſorder: The one I would name the Inflammatory, and the other the Suppurative or Purulent ſtate.

In the treatment of theſe affections, it is of the utmoſt importance to attend to this diſtinction. It ought to ſerve indeed as the baſis of our practice, in ſo far as the principal remedies to be uſed in the one ſtate are improper or even altogether inadmiſſible in the other.

During the prevalence of the inflammatory ſymptoms we rely much on the effects of blood-letting; but we ought to abſtain from this remedy when the diſeaſe has advanced to the ſuppurative ſtate. It is in this ſtate that the application of the trepan can alone give relief; while in the inflammatory ſtage, it is not only uſeleſs, but may even prove prejudicial. We ſhall afterwards, however, have occaſion to conſider this point more particularly.

External violence may induce inflammation of the brain in three different ways; by depreſſed portions of the cranium irritating the dura mater; by contuſion; and by ſimple fiſſures or fractures of the ſkull not attended with depreſſion. The firſt of theſe we have already conſidered, and ſhall now proceed to treat ſeparately of the other two.

§ 1. *Of Contuſions of the Head.*

It is not thoſe ſlighter contuſions which affect the teguments of the head only that we are now to conſider; it is ſuch as in their conſequences prove formidable by communicating inflammation to the membranes of the brain.

A contuſion of the head may be produced in the ſame manner as contuſions of other parts, by falls, blows, and by ſtones or other miſſile weapons thrown from a diſtance. It may be attended with wounds of the ſkin and other teguments; or the ſkin, as frequently happens, may be left entire.

The immediate and moſt frequent effect of ſuch blows upon the head as afterwards prove troubleſome, is to deprive the perſon of his ſenſes, and to leave ſome degree of giddineſs, which continues for a longer or ſhorter period according to the violence of the injury. In a gradual manner, however, the patient recovers ſo as commonly to be perfectly well after a night's ſleep; and unleſs a wound has been produced along with the contuſion, he ſeldom or never complains of the part on which the injury was done till ſeveral days after the accident.

The time which in ſuch caſes intervenes between the blow being given and the commencement of the after-ſymptoms is very uncertain: Theſe ſymptoms all originate from inflammation, and this again will always make a ſlow or a rapid progreſs according to the violence of the cauſe, and according to the habit of body of the patient. Hence, in ſome caſes, the inflammatory ſymptoms appear in the courſe of a day or two from the accident; whilſt, in others, the patient continues perfectly well for two, three, or four weeks; and at laſt is ſeized with pain and inflammation of the part on which the injury was inflicted, and from which alone all the train of bad ſymptoms proceed which we enumerated above: Nay, inſtances have occurred of caſes which proved to be extremely hazardous, in which no appearance of any thing morbid was obſerved on that part which received the blow, and which afterwards inflamed, till the eightieth, ninetieth, or even till the hundredth day from the accident.

Hence it is evident, that much danger may occur from accidents of this kind which at firſt appear to be trifling; a circumſtance which points out in a ſtrong point of view, the propriety of paying the moſt exact attention to every injury to which the head is expoſed.

In the treatment of contuſions of the head, the indications we ought to keep in view are,

1. To employ thoſe means which are known to prove moſt effectual in preventing inflammation.

2. When this is found to be impracticable, we ſhould attempt the reſolution of the inflammation by general remedies and topical applications.

3. When the inflammation cannot be carried off by reſolution, and when ſuppuration has taken place, a free vent ought to be procured for the matter: And,

4. If the parts affected are attacked with gangrene, we ſhould endeavour to remove it and obviate its effects.

With reſpect to the firſt indication, we have to remark, that in ſlight contuſions of the head we ſeldom have it in our power to employ any prophylactic remedies or means for preventing the acceſſion of inflammation. Patients commonly recover ſpeedily from the immediate effects of contuſions, and, till the after-ſymptoms commence, ſeldom complain of any thing but a ſlight ſoreneſs on the part which received the blow. Practitioners are not always therefore informed of accidents of this nature; and when they are, they rarely get the patient to ſubmit to any courſe that could probably prove effectual. But when this can be done, as it ſometimes may in the more violent contuſions, the means we would recommend are, Blood-letting, both general and local, to a conſiderable extent; the uſe of laxatives, ſo as to preſerve an open ſtate of the bowels; the application of the watery ſolution of ſaccharum ſaturni to the part affected; a low diet, and total abſtinence from every kind of exerciſe.

By theſe remedies the effects of many injuries of the head might be prevented: But practitioners, as we have already remarked, are ſeldom called till the bad ſymptoms have commenced; the particular treatment of which we are now to enter upon. And we are firſt to conſider how we are to effect the reſolution of inflammation of the brain. For this purpoſe, blood-letting, purgatives, mild ſudorifics, and opiates, are to be chiefly depended on, along with the proper local treatment of the injured part of the head.

In common practice, any blood to be evacuated in caſes of this nature is taken indiſcriminately from any part of the body: But by many of our older writers, and even by ſome practitioners of modern times, we are told, that blood taken from the feet proves in general more effectual than the ſame quantity taken from any other part of the body.

This, however, is an idea built upon the erroneous doctrine of derivation and revulſion, which is now very generally rejected. Inſtead of this, we find that inflammatory affections of other parts of the body are moſt effectually relieved by local blood-letting; and when blood cannot be taken from the part immediately affected, we always wiſh to take it from ſome blood-veſſel as contiguous to it as poſſible.

In like manner, in affections ſuch as we are now conſidering, any blood to be diſcharged ſhould be taken from parts as near to the ſeat of the injury as poſſible. When any conſiderable quantity has been diſcharged by the veſſels divided in the operation of ſcalping, much advantage is commonly derived from it: A circumſtance which ſtrongly indicates the propriety of local blood-letting in every caſe of this nature.

Upon this principle, when a ſufficient quantity of blood can be procured by the application of leeches, or by cupping and ſcarifying as near as poſſible to the part affected, this mode of diſcharging it ſhould be preferred: But when this cannot be done, it may be always accompliſhed by inciſions or ſcarifications made in the part affected with a lancet or ſcalpel: A practice from which I have on different occaſions experienced much advantage, and which I can therefore venture to recommend. When the ſkull is already laid bare by the accident which gave riſe to the inflammation, or when the ſcalp has been divided in order to evacuate any matter collected beneath it, there will be no neceſſity for theſe ſcarifications; but whenever the teguments remain entire, or are only ſlightly injured, and are attacked in ſome particular ſpot with inflammation, ſcarcely any remedy will prove ſo effectual in removing it as ſcarifications; which ſhould not be made merely through the ſkin, but with freedom into the parts beneath, with a view to divide the largeſt arteries of the part. In this manner any neceſſary quantity of blood may be diſcharged; which being taken from the veſſels directly affected, proves always more certainly uſeful than any other mode of diſcharging it.

When this operation however is not ſubmitted to, or when general blood-letting may be judged adviſable, it commonly proves moſt effectual to open the jugular vein or the temporal artery. With reſpect to the quantity of blood to be diſcharged, this muſt always depend on the violence of the ſymptoms and on the ſtrength of the patient: But in circumſtances ſuch as we are now conſidering, as the patient's recovery or death is probably to depend on what is done in a very ſhort ſpace of time, blood-letting, as being the remedy on which our hopes are chiefly founded, ſhould be puſhed immediately to as great a length as with ſafety can be done. Inſtead of taking away eight or ten ounces, and repeating the operation at the diſtance of a few hours as is uſually done, I always think it right, as I have juſt obſerved, to be determined in this matter by the ſtrength of the patient, and to draw off blood as long as the pulſe continues tolerably firm. As long as it does ſo, no danger can occur from the evacuation; and ſo far as I am able to judge in every caſe of violent inflammation, it anſwers the purpoſe more effectually to take away perhaps twenty or twenty-five ounces of blood at once, than to abſtract even a larger quantity by repeated operations. In the courſe of a few hours, again, if the ſymptoms ſtill continue violent, and if the pulſe remains ſufficiently full, it may be proper to diſcharge an additional quantity; but this likewiſe ſhould be determined by the effects produced by it.

Together with a plentiful evacuation of blood, the bowels ſhould be freely emptied, by briſk purgatives when theſe can be exhibited; or when the patient cannot ſwallow them in ſufficient quantities, ſtimulating injections ſhould be frequently repeated. In every affection of the head, it is an object of importance to preſerve a lax ſtate of the bowels; but it is particularly neceſſary in all ſuch as proceed from an inflamed ſtate of the brain or of its membranes. It is not, however, an open ſtate of the bowels merely which proves uſeful here. In order to receive much advantage from the practice, a ſmart purging ſhould be kept up, by repeated doſes of calomel, jalap, or by ſome of the neutral ſalts, when theſe can be ſwallowed.

As it is found in the treatment of every caſe of inflammation, that it proves highly ſerviceable to preſerve a moiſt ſtate of the ſurface of the body, this ought to be particularly attended to in an inflamed ſtate of the brain. In general, a mild perſpiration may be induced by the uſe of warm fomentations to the feet and legs, and by laying the patient in blankets inſtead of linen; but when means of this more ſimple nature do not prove effectual, medicines of the ſudorific kind may be given; and of this claſs, none prove ever ſo powerful as a proper combination of opiates and emetics.

For this purpoſe, we find Dovar's powder much recommended by a celebrated practitioner, Mr Bromfield *. But although this operates in general as an effectual diaphoretic, it is very apt to induce ſickneſs and even vomiting; an occurrence which in an inflamed ſtate of the brain we would rather wiſh to avoid. I have for a long time, however, been in the habit of uſing as a diaphoretic a medicine

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* Vide Chirurgical Obſervations and Caſes by William Bromfield, p. 12. vol. i.

cine very ſimilar to this, which at the ſame time that it ſeldom fails in exciting ſweat, rarely if ever produces ſickneſs or vomiting. Dovar's powder conſiſts of a combination of opium with ipecacuanha; This is prepared by opium being combined with an antimonial, the tinctura antimonii of different diſpenſatories, prepared with the glaſs of antimony. To an adult, fifteen drops of this tincture with four or five of laudanum may be given every two hours, till a ſweat is induced; when a very ſmall quantity of the medicine being continued from time to time will ſerve to keep up a conſtant perſpiration.

When much pain takes place, opiates ſhould be exhibited in doſes adequate to the violence of it. A general prejudice has till of late indeed prevailed againſt the uſe of opiates in every complaint of an inflammatory nature, and particularly in inflammation of the membranes of the brain; but this ſeems to have proceeded more from an erroneous idea reſpecting the proximate cauſe of inflammation, and of the modus operandi of opiates, than from actual obſervation of the effects produced by them. As the pain which accompanies every caſe of inflammation proves in many inſtances highly diſtreſſing, and as it evidently appears to have a conſiderable effect in aggravating all the other ſymptoms, the propriety of exhibiting ſedatives for removing it is obvious; and opium being the moſt powerful remedy of this claſs, it has now been long uſed by many practitioners with ſome freedom in various caſes of inflammation; and as I have frequently given it even in full doſes with no inconvenience in inflammatory affections of the brain, but on the contrary with much real advantage, I can without heſitation recommend it in every caſe of this kind when it is indicated either by much pain or reſtleſſneſs.

Theſe are the internal remedies upon which we are chiefly to depend in every caſe of inflammation of the brain from external violence; but ſome attention is likewiſe neceſſary to the external treatment of the part affected, and more advantage I think may be frequently derived from this than in general is imagined.

Inſtances are often met with of inflammatory affections of other parts of the body being much relieved by drains or iſſues inſerted in contiguous parts; and on the ſame principle I have long been in the habit of treating thoſe affections of the head which we are now conſidering, in ſuch a manner as moſt readily to induce a plentiful purulent diſcharge from the ſeat of the injury.

With a view to accompliſh this, when the original accident is attended with a wound or a diviſion of the ſkin and other ſoft parts, as the lips of the ſore are commonly found hard, painful, and very dry, ſuch applications ſhould be employed as we find to prove moſt effectual in inducing the formation of matter: The ſore ſhould be covered with pledgits of lint ſpread with any emollient ointment, and ſoft emollient poultices of a moderate degree of heat ſhould be laid over the whole: By this means, and eſpecially by a frequent renewal of the cataplaſms, ſo as to preſerve a moderate but equal heat in the ſore and contiguous parts, it commonly happens that a diſcharge of matter is induced; and this being attended with a diminution of pain and a removal of the hardneſs of the parts affected, all the other ſymptoms which take place are thereby in general either much mitigated, or perhaps entirely removed.

In ſuch caſes, again, as are not attended with a diviſion of the teguments, ſo ſoon as there is any reaſon to ſuſpect, from the parts which received the injury becoming pained and ſwelled at the diſtance of ſeveral days perhaps from the accident, that bad ſymptoms may ſupervene, the tumour ſhould be immediately laid open, by dividing the ſkin and teguments down to the pericranium, and if that membrane is found to be ſeparated and elevated from the bone, it ought likewiſe to be laid open: By this means any matter that is confined, and which otherwiſe might have done miſchief, will be diſcharged; and by inducing a ſuppuration upon the ſore in the manner we have mentioned, the ſymptoms of inflammation, which would in all probability have become violent, may poſſibly be prevented.

In the treatment of tumours of this kind, we commonly delay opening them till the fluctuation of a fluid can be diſtinctly perceived. In this, however, I think we are wrong; for any matter that is formed in theſe ſwellings is conſtantly of a thin acrid nature; ſo that to confine it for any length of time in cloſe contact with the ſkull, muſt not only render the bone liable to become carious, but muſt incur ſome hazard of inducing and ſpreading the inflammation upon the parts within the ſkull: For as a very intimate connection takes place between the veſſels of the pericranium and of the dura mater; and as it is evident, in affections of this nature, that the external parts are firſt affected, and that the dura mater becomes inflamed only in conſequence of its connection with theſe, I have long thought it probable, that the confinement of acrid matter beneath the pericranium, is to be conſidered in every inſtance of this kind as the moſt frequent cauſe of the inflammation being communicated to the parts within the ſkull; and accordingly I have been in the habit of diſcharging it by a free inciſion, as ſoon as the leaſt tumefaction on the part affected is obſervable, and evidently with much advantage.

In every caſe, indeed, of injuries done to the head, in which the ſymptoms do not commence till ſeveral days after the accident, as it is clear that the cauſe of the diſorder has not originally affected the brain or its membranes, for if it did ſo its effects would be immediate, it is probable that it operates almoſt ſolely by forming ſome effuſion externally between the pericranium and the ſkull: And as we know that membranous parts ſeldom or never afford good pus, any effuſion which takes place muſt commonly be of a nature that will not readily proceed to the purulent fermentation; and will therefore be apt to acquire that kind of acrimony which is very generally met with in every fluid which has been ſome time extravaſated in conſequence of external violence, and which from its nature cannot be converted into pus.

If the original effuſion has been conſiderable, an evident tumefication will take place from the beginning: But it often happens, that it is in ſuch a ſmall quantity as ſcarcely to produce any perceptible ſwelling at firſt; in which caſe, as little or no tenſion occurs, the patient feels very little uneaſineſs in the part which received the injury till the effuſed fluid begins to turn acrid, which may happen ſooner or later in different inſtances, according to the violence of the injury, and habit of body of the patient, as well as other circumſtances. But as ſoon as it has acquired any degree of acrimony, the irritation produced by it on the contiguous parts, occaſions pain, inflammation, and ſwelling; and as the pericranium and aponeurotic expanſions of the muſcles are very firm and ſtrong, if this acrid matter be not ſoon evacuated by an inciſion, it gradually inſinuates itſelf between thoſe parts of the pericranium and bone beneath, which were not at firſt affected; and as this extends the effects of the diſorder, ſo it not only produces an increaſe of the external ſwelling, but, by means of the vaſcular connection we have mentioned between the pericranium and dura mater, the inflammation is at laſt conveyed to the parts within the ſkull; and as ſoon as theſe are affected, but never till then, the bad ſymptoms, which always occur upon the membranes of the brain becoming inflamed, are ſure to take place.

It is therefore extremely probable, that the confinement of this acrid matter beneath the pericranium, muſt have a conſiderable influence in extending the effects of the diſorder; and hence the diſcharge of it by an inciſion ſhould be always adviſed whenever there is any reaſon to ſuſpect, from the occurrence of pain and a ſmall tumefaction as the conſequences of external violence, that matter is collected even in the ſmalleſt quantity between this membrane and the ſkull.

It muſt be remarked, however, that we do not by any means recommend this practice in the treatment of tumours recently formed by external injuries. It often happens, that a ſwelling of a conſiderable ſize occurs inſtantly upon a blow being given to any part of the head: but in general this ſoon diſappears by the uſe of mild aſtringent applications, particularly of any of the ſaturnine ſolutions; of crude ſal ammoniac diſſolved in water; or of common brandy. It would therefore be extremely improper, in ſuch caſes, to lay the parts affected open by an inciſion: a practice, however, which has often been attempted by thoſe not much verſant in this branch of buſineſs; for as ſwellings of this kind frequently afford, upon examination with the fingers, a ſenſation ſimilar to what is experienced from a depreſſion of the ſkull, ſo they have in many inſtances been laid open, in order to diſcover the real ſtate of the parts beneath: But no practitioner of experience will ever be deceived by appearances of this nature; nor will he ever proceed to lay the ſkull bare, unleſs there are more evident marks of its being injured, or of there being ſome extravaſation beneath the ſkull itſelf. But whenever a tumour, attended with pain, appears at a diſtant period upon the ſpot on which a blow or a bruiſe was received, as it ſeldom or never happens that ſwellings of this kind are of a harmleſs nature, or that they can be diſcuſſed by external applications, they ought in every inſtance to be laid open as ſoon as they become in any degree perceptible. By doing ſo, we can never do any harm; and by evacuating an acrid matter, which in almoſt every caſe of this kind we will find collected beneath the pericranium, much real advantage may be derived from it.

An inciſion made for evacuating matter muſt neceſſarily go to the depth at which the matter is ſeated; otherwiſe the purpoſe for which it is intended will not be anſwered: And in the caſe of which we are now treating, as it is almoſt in every inſtance collected beneath the pericranium, this membrane muſt always be freely divided. But in thoſe ſcarifications we had occaſion to adviſe for the purpoſe of evacuating blood, as they are ſuppoſed to be neceſſary before any tumour has appeared, and are not intended for the evacuation of matter, there is no neceſſity for carrying them to ſuch a depth. They ought indeed to paſs freely into the cellular membrane, otherwiſe the arteries of the part will not be ſufficiently divided; but as no additional advantage could in this ſtate of the diſeaſe be received from dividing the pericranium, and as the bone might be injured by it, it ought to be avoided.

After an inciſion, made in the manner we have mentioned, the wound ſhould be dreſſed with any emollient ointment; and by a frequent renewal of warm emollient poultices over the whole, a plentiful ſuppuration will be induced, which, as we have already remarked, proves commonly very effectual, not only in preventing, but in removing, all thoſe bad ſymptoms which an inflammatory affection of theſe parts is ſure to induce.

We have thus pointed out the means to be employed for the removal of inflammation of the brain by reſolution: We ſhall now make a few obſervations upon the remedies to be uſed when the diſorder has either proceeded to ſuppuration, or when, on the removal of a portion of the cranium, the dura mater is found to be ſloughy, with a tendency to gangrene; and this will include what we have to ſay upon the third and fourth indications of cure which we formerly mentioned.

When the inflammatory ſymptoms have not yielded to the means of cure recommended above; but have, on the contrary, increaſed in violence, and are ſucceeded by coma, paralyſis, irregular convulſive motions, involuntary paſſage of the fæces and urine, dilatation of the pupils and inſenſibility to the impreſſion of light, along with a ſlower and full pulſe; and more eſpecially when theſe ſymptoms have been preceded by fits of rigor or ſhivering; we then conclude with much certainty, that the ſuppurative ſtate of the diſorder has taken place; that matter is formed within the ſkull, and operates by occaſioning compreſſion of the brain.—Shivering fits take place on the formation of large abſceſſes wherever they are ſituated; but in inflammatory affections of the brain, they prove ſo certainly characteriſtic of the diſeaſe having terminated in ſuppuration, that no doubt ſhould remain of this having occurred whenever they are obſerved to accompany the other ſymptoms we have mentioned.

The exiſtence of matter within the cranium being aſcertained, as no other remedy can be depended on for the removal of it, the trepan ought to be immediately employed; and as the ſafety of the patient is to depend entirely on a free evacuation of the collected matter, it ought to be applied with much freedom. In ſuch circumſtances indeed it muſt be the height of timidity alone that can make a practitioner heſitate in forming as many perforations in the ſkull as can probably be required.

When, on perforating the ſkull, there is little or no matter met with immediately beneath, if the dura mater appears to be more tenſe than uſual, as this will give cauſe to ſuſpect that the ſymptoms of ſuppuration have originated from matter collected between this membrane and the pia mater, or perhaps upon the brain itſelf; we ought by no means to reſt ſatisfied with having merely perforated the bone: If in ſuch circumſtances we proceed no farther, the matter will ſtill remain confined; the brain will be as much compreſſed as before; and of courſe no advantage will be derived from the operation.

In this ſituation, therefore, a practitioner ſhould not heſitate in laying the membranes of the brain open. But, for the method of effecting this, as well as for ſome farther obſervations upon this point, we muſt refer to the ſecond ſection of this chapter, where the conſideration of it was entered fully into.

When, again, it is found, on perforating the ſkull, that the dura mater has already become ſloughy, with ſome tendency to gangrene, the utmoſt danger is to be dreaded: If mortification has commenced, there will be much reaſon to imagine that death will ſoon terminate the ſcene; but different inſtances have been met with of ſloughs forming upon the dura mater, and of cures being accompliſhed after theſe have ſeparated: All, however, that art ſhould in ſuch caſes attempt, is to preſerve the ſores clean; to take care that any matter which may form ſhall be as freely diſcharged as poſſible; for this purpoſe that nothing but light eaſy dreſſings ſhall be employed; and that the internal uſe of Peruvian bark, conjoined with elixir of vitriol, ſhall be immediately adviſed in as great quantities as the ſtomach will bear. If any tendency to inflammation ſtill prevails,

vails, the diet ought to be low and cooling, with a plentiful allowance of whey or any other diluent drink, and the bowels ought to be kept moderately open: but, on the contrary, when the ſyſtem is low and the pulſe feeble, wine ought to be exhibited as the moſt effectual cordial. In other reſpects, the patient ought to be treated by ſuch means as are found to prove moſt beneficial in ſimilar affections of other parts of the body; but as theſe have been already treated of particularly in a former publication, we do not think it neceſſary to enter farther upon them at preſent*.

Before leaving this ſubject, it is proper, perhaps even neceſſary, to take notice of a practice which has been very prevalent, the indiſcriminate application of the trepan in the inflammatory as well as in the purulent or ſuppurative ſtage of the affection of which we have now been treating. It has been common, in every caſe of this kind, in the firſt place to preſcribe large evacuations; and if theſe fail in procuring

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[*] Vide Treatiſe on Ulcers, &c.

ring relief, to apply the trepan immediately, whatever may be the ſtage of the diſorder.

This practice is chiefly founded upon an idea of the operation of the trepan being an innocent remedy. In ſupport of this opinion, experiments are related of the operation having been performed in ſound animals with a view to determine the queſtion, Whether expoſure of the brain to the air is detrimental or not? And as it has happened in ſeveral inſtances, that no evident bad effects have enſued, a general concluſion has been drawn in favour of the operation.

But were we for a moment diſpoſed to admit the truth of this concluſion, yet one great objection to the application of the trepan in an inflamed ſtate of the brain would ariſe from this conſideration, that no benefit could poſſibly be derived from it. The ſole object we have in view in performing the operation of the trepan, is to remove preſſure from the ſurface of the brain: But in the inflamed ſtate of this organ, as no preſſure exiſts, it would be abſurd to think of accompliſhing this intention.

If practitioners would allow themſelves to be directed by the effects of thoſe remedies which they find to prove uſeful in ſimilar affections of other parts of the body, inflammation of the brain, or of its membranes, would never be treated in this manner: We would not ſurely expect to reap any benefit, ſo long as ſymptoms of inflammation continue, from perforating the cheſt in inflammatory affections of the pleura; nor would any ſurgeon adviſe it till the formation of matter was fully indicated.

Independently, however, of this conſideration, I am decidedly of opinion, that the trepan cannot be applied in caſes of inflammation of the brain without manifeſt hazard: The ſymptoms of inflammation are uniformly increaſed by it; and in almoſt every inſtance in which I have known it employed during this ſtate of the diſeaſe, the dura mater has been found, after death, either in a ſtate of mortification, or covered with purulent matter.—Theſe effects we may ſuppoſe to be in ſome meaſure the conſequence of admiſſion of air to the brain; and they may be partly owing to the violent ſeparation of a portion of the cranium from the inflamed dura mater, to which it adheres firmly in almoſt every point.

Neither is this the only ground on which I would object to the practice: Contrary to the received opinion, I think that the operation of the trepan is in itſelf dangerous even when performed in a ſound ſtate of the brain where no inflammation takes place.—Several years ago I made a variety of trials to determine this point; and nearly one-fourth of the animals that underwent the operation, appeared to me to die in conſequence of it alone.

It is not, however, from the effects of this operation on other animals alone that I wiſh to draw any concluſion; but when conſequences ſimilar to what I have now ſtated reſult from it when performed on the human body when no immediate injury had been done to the head, they will ſurely be allowed to have ſome weight in eſtabliſhing the opinion I have advanced. —I have accidentally met with three caſes much in point, in none of which there was any appearance of inflammation of the brain previous to the operation; and yet two of the patients died in a few days after the perforation of the ſkull, evidently from inflammation induced upon the dura mater. As caſes of this nature are rarely met with, and as the reſult of theſe tends to eſtabliſh the truth of the opinion I have endeavoured to inculcate, I ſhall here give a ſhort account of them.

In caſes of inveterate epilepſy, where every other means of relief have failed, it has been propoſed, by way of experiment, to ſee what effects would reſult from the preſſure of the atmoſphere being freely applied to the brain by one or more perforations made in the ſkull with the trepan. Any advantage to be expected from this I muſt acknowledge to be extremely doubtful; and the effects of it in ſuch inſtances appear to me to be ſo uncertain and even hazardous, that I ſhould never think of adviſing it. But it has ſo happened, that I have known of two inſtances of its having been done by others: And in a third I had occaſion to put it in practice myſelf, upon a gentleman who had laboured under epilepſy for upwards of twenty years. But in this caſe, as the fits appeared to be the conſequence of an injury received in childhood upon the forehead; as the external appearance of the part on which the injury was inflicted afforded much reaſon to ſuſpect that a ſmall portion of the ſkull was depreſſed at this place; as there was ſome reaſon therefore to ſuppoſe that the fits depended upon this cauſe, and as they were at this time become extremely violent, it was the opinion of ſeveral practitioners, as well as the earneſt deſire of the patient, that the trepan ſhould be employed. This was accordingly done; the portion of the ſkull which received the blow was taken out; and matters went on very favourably till the end of the ſecond day from the operation,

tion, when ſymptoms of inflammation occurrred; and notwithſtanding all the pains that could be employed, he died in little more than forty-eight hours from this period. On opening the head, a great quantity of pus was found, not only upon the dura mater, but upon the pia mater, and even between this membrane and the brain; and as there was not till within twenty-four hours of his death any ſymptoms of a compreſſed brain, there is much reaſon to think that the matter was formed merely in conſequence of inflammation induced by the operation; and therefore that the means employed for the patient's relief had evidently haſtened his death.

One of the others on whom this operation was performed recovered from the immediate effects of it, but with no alteration or abatement of the fits for which it was employed. The other died on the ſeventh day from the operation: Symptoms of inflammation appeared on the third; and theſe were at laſt ſucceeded by evident marks of compreſſion of the brain:

A conſiderable quantity of matter was found between the dura and pia mater, and even beneath this membrane, not merely on the parts contiguous to the wound, but over the whole ſurface of the brain down to the baſis of it.

We have here two caſes, very diſtinctly marked, of the hurtful effects produced by this operation even in a ſound ſtate of the brain, at leaſt where no previous inflammation appeared to exiſt in it. The ſymptoms of inflammation which ſupervened in both inſtances, were evidently the conſequence of the perforations: Suppuration enſued in each of them; and as both the patients died in the ſpace of a few days from this period, no doubt can be entertained of the cauſe of their death.

Upon the whole, therefore, the operation of the trepan appears to be inexpedient, and even dangerous, in an inflamed ſtate of the brain: But when ſuppuration has taken place, and when matter formed within the ſkull operates as a cauſe of compreſſion, as this operation affords the only chance of ſafety, it ſhould be employed with freedom, according to the particular circumſtances of every caſe.—We proceed now to the conſideration of Fiſſures or ſimple Fractures of the Skull.

§ 2. *Of Fiſſures, or ſimple Fractures of the Skull.*

THE term Fiſſure is here meant to imply a mere diviſion or ſimple fracture of the ſkull not attended with depreſſion, and it may either penetrate the whole thickneſs of the bone, or be confined to one lamella of it only: A fiſſure too may be either attended with a diviſion or wound of the correſponding teguments, or theſe may be left entire.

We have already had occaſion to remark, that injuries done to the head, prove hazardous nearly in proportion to the violence which the brain receives from them: So that fiſſures, in ſo far as they affect the ſkull only, are not to be conſidered as dangerous; but as they are frequently combined with affections of the brain from the beginning, and are on other occaſions productive of conſequences from which that organ is ultimately brought to ſuffer, they of courſe require our moſt ſerious attention. It often indeed happens, that very extenſive fiſſures heal without the occurrence of any bad ſymptoms; but as others of apparently a trivial nature frequently terminate in the moſt fatal manner, we cannot with propriety in any inſtance treat them with neglect.

Fiſſures of the ſkull may prove dangerous, either by being productive of effuſions upon the brain, or by tending to excite inflammation of the dura and pia mater.

When effuſions take place, as this muſt be immediately attended with ſymptoms of compreſſion, thoſe means muſt be put in practice which we know to be beſt ſuited to the removal of them; but as theſe have been already fully treated of in the preceding ſections, we do not think it neceſſary to enter into a particular detail of them at preſent; and ſhall juſt ſhortly obſerve, that for the removal of ſuch effuſions,

ſions, a proper application of the trepan is alone to be depended on: The fiſſures ought to be traced through their whole extent; and a perforation being made in the moſt depending part of them, if this does not prove altogether ſucceſsful, the operation ſhould be repeated along the courſe of the fractures, ſo long as any ſymptoms continue of a compreſſed ſtate of the brain; care being always taken to include the fiſſure in every perforation: For as the cauſe of all the miſchief will in general be found contiguous to fractures of this kind, it would ſeldom anſwer any good purpoſe to perforate the ſkull at any diſtance from them.

It is therefore ſcarcely neceſſary to obſerve, when, in affections of this nature, it is judged proper to apply the trepan, that care ſhould be taken to trace the courſe of the different fiſſures with as much exactneſs as poſſible; for which purpoſe, ſo ſoon as the operation is determined on, if the whole extent of the fracture is not previouſly diſcovered, it muſt now be done by making an inciſion with a ſcalpel thro' the ſkin and other teguments down to the pericranium; and by carrying it ſlowly on, and taking care to follow the direction of the fiſſures, they may thus be brought freely into view.

When fiſſures are of ſuch magnitude as to produce any obvious ſeparation of the two ſides of the fractured bone, the nature of the caſe is at once rendered evident; but it often happens, that the crack produced by a fiſſure is ſo extremely ſmall as to render the opinion of the operator ſomewhat doubtful with reſpect to it: A little attention, however, to the different circumſtances of the patient's ſituation, will at all times prevent any heſitation reſpecting the means to be employed for his relief.

The only appearances with which a fiſſure is in danger of being confounded, are thoſe indentations formed on the external ſurface of ſome parts of the ſkull by the blood-veſſels which run upon it;

and by the different ſutures by which the bones of the ſkull are united together.

When the part affected is not denuded of the pericranium, we may in general be determined with ſome certainty of the nature of the caſe, by the degree of adheſion which occurs at this part between this membrane and the bone. The pericranium, as we have ſeen, naturally adheres firmly to every part of the ſkull, and particularly at the ſutures; and as one certain effect of a fiſſure is to deſtroy this connection entirely, when in caſes of this kind the pericanium is found to adhere to the bone beneath, we may conclude without heſitation, that the part remains entire; and, on the contrary, when this membrane is looſe and ſomewhat ſeparated from the bone, there will be much reaſon to imagine that any rent or crack which appears at this part is produced by a fracture.

It often happens, however, that we are deprived of this means of detecting fiſſures, by the pericranium along with the other teguments being entirely ſeparated by the acident, accident for a conſiderable ſpace from the parts beneath. In ſuch circumſtances, various means have been propoſed for obtaining ſome certainty of the nature of the caſe. By pouring ink over the ſurface of the denuded bone, the whole of it, we are told, may be wiped off, if the bone be not fractured; but, wherever there is a crack or fiſſure, that it will be impoſſible even with the aſſiſtance of water to remove it. By making the patient keep a firm hold with his teeth of one end of a hair, or of a piece of catgut, while the other extremity of it is ſecured at ſuch a diſtance as to render it tenſe, if it be now ſtruck, the vibrations thus produced will create, we are told, a very ſenſible degree of uneaſineſs in the part affected if it be fractured; but will not otherwiſe have any influence. And, again, it is ſaid, if the patient be made to chew a bit of bread, or any other hard ſubſtance, that ſome pain will occur from it if the bone be fractured; but otherwiſe, that the part affected will not ſuffer from it.

None of theſe teſts, however, are to be much depended on; neither of the two laſt have any effect, unleſs the fiſſure be extenſive, and the ſides of the fractured bone conſiderably ſeparated from one another, when this means of diſtinction can never be neceſſary; and as ink penetrates the ſutures of the ſkull unleſs when they are very firmly oſſified, it can ſeldom happen that any trial to be made with it will be productive of any advantage.

It commonly happens, in fiſſures which extend through the whole ſubſtance of the ſkull, and even in ſuch as penetrate only to the diploë, that blood continues to ooze from them for a long time after the accident, and it conſtantly returns again almoſt as ſoon as it is wiped off: This is one of the moſt characteriſtic marks of a fiſſure; and when it occurs, it points out with preciſion the nature of the caſe. But there is no neceſſity, we may remark, for ſo much anxiety on this point as is commonly expreſſed by practitioners; for, unleſs when ſymptoms of an alarming nature are met with, we ſhall preſently endeavour to ſhow that no operation ought to be adviſed: and again, when ſymptoms take place of a compreſſed brain, if any appearances occur of a fiſſure in that part of the ſkull which has recently received a blow; however equivocal theſe may be, yet as this is moſt probably the ſeat of the injury, no doubt ſhould be entertained of the propriety of applying the trepan at this place. If it ſhould afterwards appear that the trepan has even been applied upon a ſuture, as the ſurgeon under ſuch uncertainty would proceed with much caution, no detriment could enſue from it; and if it ſhould prove to be a real fracture, it would afford much ſatisfaction to any operator to find that the perforation had been made where alone it could prove ſerviceable.

But altho' we have in this place, as well as in other parts of theſe obſervations, recommended the trepan as the only remedy to be depended on for the removal of ſymptoms of a compreſſed brain; yet unleſs where ſymptoms of this kind take place, even the preſence of a fiſſure ought by no means to indicate this operation: But as this is a point upon which I happen to differ from many of the profeſſion; and as it is of much importance in practice to have it duly attended to; I ſhall enter more minutely into the conſideration of it than might otherwiſe be neceſſary.

In the treatment of affections of this nature, it has hitherto been almoſt a general rule, to conſider the application of the trepan as abſolutely neceſſary in every caſe of fiſſure, whether any ſymptoms of compreſſion of the brain have occurred or not. But due attention to the real nature of a fiſſure, and to the effects we have reaſon to expect from perforating the ſkull, will ſhow, that although fiſſures are frequently combined with ſuch ſymptoms as require the aſſiſtance of the trepan, yet that they are not always or neceſſarily ſo; and unleſs when ſuch ſymptoms actually exiſt, that this operation, inſtead of affording any relief, muſt frequently do miſchief: for it is by no means calculated for, or in any reſpect adequate to, the prevention of them; and we have already endeavoured to ſhow, that laying the brain bare is never to be conſidered as harmleſs; and therefore that it ought never to be attempted but when there is ſome probability of advantage being derived from it.

When a fiſſure is attended with a compreſſed ſtate of the brain, there can be no heſitation, as we have ſaid, in recommending an immediate application of the trepan: But in the caſe of a fiſſure not accompanied with any ſymptom of this nature, and while the patient complains of nothing but perhaps a ſlight degree of pain in the contuſed part, an occurrence by no means unfrequent; what advantages are we to expect from perforating the ſkull? In ſuch circumſtances, we are certain that no extravaſation takes place; and that no part of the ſkull is depreſſed, otherwiſe ſymptoms would occur of a compreſſed ſtate of the brain: For what purpoſe, therefore, ſhould the trepan be applied? No ſufficient reaſon I believe can be given for it.

In the caſe of a ſimple fiſſure, not attended with any bad ſymptoms, the moſt alarming occurrence that we have to dread is the acceſſion of inflammation; for it frequently happens, that the membranes of the brain become afterwards inflamed, although the patient may have remained perfectly well for ſeveral days, nay even for weeks, after the injury which produced the fracture was inflicted. Now, whoever attends to one of the immediate effects of the trepan, namely, the violence produced by it upon the dura mater, together with the admiſſion of air to the parts within the ſkull, muſt acknowledge, that this tendency to inflammation, which in accidents of this kind is the circumſtance which of all others we have moſt cauſe to dread, inſtead of being leſſened by this operation, muſt in all probability be rendered more conſiderable; ſo that as a preventative of bad ſymptoms this remedy ought never to be employed.—It has indeed been keenly held forth by thoſe who favour and ſupport a contrary opinion, that, in fiſſures of the ſkull, no additional riſk can be incurred by the operation in queſtion; for it is ſaid, that air being already admitted to the brain by the fracture itſelf, the trepan cannot poſſibly afford a more free acceſs to it; while at the ſame time, they obſerve, it is attended with this very important advantage of forming and preſerving a free vent for any matter that may happen to form between the ſkull and the dura mater during the cure.

This argument is ſomewhat ſpecious, but it will not on examination be found to merit much attention. For, when fiſſures are ſo extenſive as to produce any conſiderable degree of ſeparation between the ſides of the fractured bone, a more ſufficient vent is thus procured for any matter that may form than could poſſibly be obtained by any operation: And again, in fiſſures of leſſer extent, as they do not always terminate in the formation of matter beneath the ſkull, but, on the contrary, as they frequently do well without the occurrence of any bad ſymptom whatever, it cannot ſurely be conſidered as prudent to adviſe a hazardous operation, merely for the chance of its becoming neceſſary. And beſides, inſtances are often met with, in which fiſſures penetrate no deeper than the external table of the ſkull: a circumſtance which cannot be previouſly known; and for which even the warmeſt ſupporters of the practice in queſtion would never ſurely recommend a perforation through the whole ſubſtance of the bone.

The idea which has hitherto very univerſally prevailed, reſpecting the harmleſs nature of this operation, has probably contributed more than any other circumſtance to eſtabliſh the opinion reſpecting the propriety of performing it in every caſe of fiſſure: but if the opinion we have endeavoured to inculcate upon this point be well founded, any utility which can ever probably be derived from it, will be more than counterbalanced by the hazard with which we ſuppoſe it to be at all times attended.

Whilſt no bad ſymptoms have ſupervened, a fiſſure of the ſkull ſhould be treated, we think, merely as a cauſe which may give riſe to inflammation. The patient ought to be blooded once and again in proportion to his ſtrength; the bowels ought to be kept lax; the ſore ſhould be treated with mild eaſy dreſſings; and ſo long as there is any cauſe to ſuſpect that inflammation may occur, violent exertion of every kind ſhould be avoided: for although, in ſuch circumſtances, we would not, for the reaſons mentioned above, adviſe the common practice to be continued, of perforating the ſkull in every caſe of fiſſure, we are perfectly clear in this, that fiſſures ought always to be treated with much attention, and ſhould have the moſt effectual means employed for obviating thoſe effects with which they are always attended when inflammation occurs as the conſequence of them.

By the means we have pointed out, a cure will be frequently obtained, without putting the patient to the hazard of ſuffering by the operation of the trepan; but when from the violence of the injury, or from any other cauſe, they are found to fail, and that any inflammation which occurred has terminated in ſuppuration, as in ſuch circumſtances nothing but a free diſcharge being given to the matter can render the patient ſafe, this operation will now with much propriety be employed: but for the reaſons already advanced, I muſt again ſay, till this ſtage of the diſeaſe takes place, the perforation of the ſkull ought not to be recommended. The arguments adduced in ſupport of this opinion in different parts of this and of the preceding ſections, appear of themſelves to be ſatisfactory; but in a point of ſuch importance, no perſon ought to ſpeak deciſively, merely from theoretical reaſoning. When a probable opinion, however, is found to be ſupported by the reſult of experience, we are more readily induced to give our aſſent to it than we can ever do to a mere practical fact; and as all the obſervation I have been able to make reſpecting the point under conſideration, tends to ſupport the practice here inculcated, it is without heſitation that I have ventured to propoſe it.

SECTION VI.

Concluſion.

THE importance of the ſubject which we have juſt been conſidering, together with the intricacy in which it is involved, have led to a length of diſcuſſion which I did not at firſt expect: If, however, in treating of injuries of the head from external violence, I have in any degree contributed to remove the perplexity which has hitherto obſcured the ſubject, ariſing, as well from the complicated nature of the injuries themſelves, as from the manner in which authors have generally handled them; the time I have ſpent, and the pains I have taken, will not be thought miſapplied.

The length to which this chapter has ex-

extended, points out the propriety of our endeavouring to bring the more material parts of the ſubject into one point of view: On this account, the following recapitulation is ſubjoined by way of concluſion.

1. It appears, that in a ſtate of health the cavity formed by the bones of the ſkull is completely filled with the brain and its membranes.

2. That a direct communication takes place between the external covering of the ſkull and the parts contained within it, by means of blood-veſſels paſſing between the dura mater and the pericranium, eſpecially at the different ſutures.

3. From this mechaniſm, we perceive how the ſmalleſt diminution of the cavity of the ſkull, however it is produced, muſt always occaſion compreſſion of the brain: And from it alſo we are able to account for the ready communication of inflammation from the external teguments of the ſkull to the dura mater.

4. The various ſymptoms which occur

from injuries done to the head, may be referred to three general effects; compreſſion, concuſſion, and inflammation of the brain.

5. In a compreſſed ſtate of the brain, the ſafety of the patient depends ſolely upon the removal of the cauſe by which the compreſſion is produced. When a portion of the bone has been beat in, and is at the ſame time ſo looſe as to admit of its being taken away by the fingers of the operator, by means of a pair of pliers, or perhaps of a levator, theſe only ſhould be employed: But when the portion of the bone that may be beat in is firmly fixed, or when the compreſſion ariſes from effuſion of blood, of ſerum, or from the formation of pus, the proper application of the trepan can alone afford relief; and we ought not to heſitate in employing it.

In ſuch circumſtances, the patient is in a very hazardous ſituation; and perforating the ſkull with the trepan as frequently as may be neceſſary, may prove, as it often has done, a very effectual remedy.

6. We are by no means to imagine, as many have done, that a ſurgeon has accompliſhed all that is incumbent on him, ſo ſoon as the operation of the trepan is finiſhed. Indeed, little advantage will in general be derived from it, if other circumſtances relating to the ſituation of the patient are neglected. As the cauſe producing the compreſſion, whatever it may be, muſt injure the membranes of the brain conſiderably, care ſhould be taken, as far as poſſible, to obviate the effects of it. No doſſils, or ſyndons as they are termed, ſhould be crammed into the perforations made by the trepan, and every irritating application ſhould be avoided. The whole ſurface of the ſore ſhould be lightly covered with ſoft lint ſpread with any emollient ointment; and this, with a compreſs of ſoft old linen, ſhould be retained by a common night-cap, as the eaſieſt and beſt bandage that can be applied to the head. The patient ſhould loſe blood in proportion to his ſtrength; his bowels ſhould be kept lax; his ſkin ſhould be pre-

ſerved ſoft and perſpirable; a low diet ſhould be recommended; and he ſhould be kept free from noiſe and every kind of diſturbance.

7. When ſymptoms which originate from external violence done to the head, depend on concuſſion or commotion of the brain; as this cauſe ſeems to operate chiefly by inducing debility of the whole ſyſtem, the common practice of diſcharging much blood, and of giving ſtrong purgatives, ought to be avoided.

Inſtead of this, a moderate uſe of wine, as well as of other cordials, ſhould be recommended, together with a nouriſhing diet; whilſt bliſters and other ſtimulants ſhould be applied to the head itſelf. In long continued affections proceeding from this cauſe, ſuch as loſs of memory and imbecillity, electricity may be ſafely employed. I have known ſome inſtances where it appeared to prove highly ſerviceable.

8. In the treatment of injuries done to the head, it ſhould always be kept in view, that inflammation of the membranes of the

brain very ſeldom takes place immediately, but ſupervenes at ſome diſtant period from the injury being received: In conſequence of which, accidents which do not at firſt appear to be of much importance, frequently terminate fatally.

In caſes of this kind, we ſhould adhere to ſuch means of cure as are known to prove moſt effectual in inflammatory affections of other parts. General and local blood-letting ſhould be chiefly depended on, and ought always to be carried as far as the ſtrength of the patient admits. The bowels ſhould not only be kept lax, but ſtrong purgatives ſhould be adviſed: Mild ſudorifics prove ſometimes ſerviceable; and when the patient is reſtleſs, and eſpecially when violent pain occurs, opiates in ſufficient doſes are frequently found to prove uſeful.

When an inflammatory ſtate of theſe parts has been induced by a contuſed wound of the external teguments, warm emollient poultices are the beſt application that can be made to the ſore. By inducing a diſcharge of matter from the neighbourhood of the inflamed parts, they prove often extremely ſerviceable. Again, when the ſkin and other ſoft parts have not been divided by the contuſion, they ſhould be laid open upon the firſt appearance of a tumour, without expecting or waiting for a complete ſupuration.

In recommending this treatment, I have departed from the common mode of practice, which directs the immedate application of the trepan if blood-letting and other evacuations do not give ſpeedy relief; and I have done ſo for two reaſons.

In the real inflammatory ſtate of the membranes of the brain, compreſſion of that organ does not take place: It is not indicated by the ſymptoms which take place; nor is it met with on diſſection in ſuch patients as die in this ſtage of the diſeaſe: Perforating the ſkull therefore in this ſituation can do no good. And, farther, the operation of the trepan in itſelf, is not, as is generally imagined, innocent and harmleſs. By admitting a free acceſs of the air to the membranes of the brain, as well as from other cauſes, it has a ſenſible effect in exciting and promoting inflammation of theſe parts. Applied therefore in this caſe, the trepan may aggravate, but cannot relieve the complaint for which it is uſed.

9. When, notwithſtanding our endeavours to remove inflammation of the membranes of the brain by reſolution, this affection proceeds to the purulent ſtate, the formation of pus either upon the ſurface of the dura mater or within this membrane, acting as a cauſe of compreſſion, muſt in every reſpect be treated as an effuſion induced in any other manner. In this ſituation, the operation of the trepan is indiſpenſably neceſſary; for by no other means can the matter be evacuated, or the ſafety of the patient inſured.

In performing this operation, inſtead of removing a conſiderable portion of the ſkin and other teguments, as has commonly been done, a ſimple inciſion upon the part on which the inſtrument is to be applied is all that is neceſſary; and no more of the pericranium ſhould be removed than is required for the ſame purpoſe.

10. During the progreſs of the cure after the application of the trepan, fungous excreſcences are apt to ſhoot out from the different perforations in the bone. There is ſeldom, however, any reaſon for our attempting to remove them, as is commonly done, by compreſſion, cauſtic, or ligature; for in general they diſappear ſoon after the oſſifying proceſs is completed in the ſeveral openings. But when this does not happen, and when they ſtill continue to prove troubleſome after the reſt of the cure is accompliſhed, they may with ſafety be taken away either with cauſtic or the ſcalpel.

In ſeveral points of importance treated of in the preceding ſections, I happen to differ from ſeveral authors of reputation, particularly from Mr Pott, whoſe opinion I am always inclined to treat with deference: But however diffident I am in firſt diſſenting from an eſtabliſhed doctrine, if my own experience is found to juſtify this diſſent, the more reſpectable the authority by which the contrary opinion is ſupported, the more I think it neceſſary to inveſtigate the merits of it.

But in propoſing modes of practice different from what are ſanctioned by long cuſtom, I have never been conſcious of being actuated by a ſpirit of innovation, or a deſire of appearing ſingular: And whenever I have ventured to diſſent from men of known abilities, I have always endeavoured, with fairneſs and candour, to ſtate the reaſons of my doing ſo, and the grounds upon which my opinions are formed: At leaſt this has been my intention; and I hope it will appear to others that I have done ſo.

CHAPTER XXVII.

Of the Diſeaſes of the EYES.

SECTION I.

Anatomical Deſcription of the EYE.

THE object of this chapter is the chirurgical treatment of the diſeaſes of the eye and parts immediately connected with it: Hence it will comprehend the conſideration of thoſe affections to which the lachrymal paſſages are liable. But before proceeding farther, it will be proper to premiſe an anatomical deſcription of the eye.

Minuteneſs on this ſubject would lead to a greater length than the extent of this work will admit, and is not by any means neceſſary: We ſhall therefore give only ſuch a general deſcription as the nature

ture of the diſeaſes, and the operations of which we are to treat, ſeem to require.

The eyes, with part of their appendages are placed in two bony cavities, termed the Orbits, formed by a conjunction of the inferior part of the frontal bone with ſeveral other bones of the head and face; namely, with the oſſa maxillaria, oſſa malarum, oſſa unguis, os ethmoides, os ſphenoides, and oſſa palati. All the upper part of the orbits is formed by the orbitar proceſſes of the frontal bone; and the ſame proceſſes form a conſiderable vacuity in each orbit towards the external canthus of the eye, in which the glandula lachrymalis is lodged. The inferior part of the orbits is formed by the oſſa maxillaria and oſſa malarum, which alſo form part of the ſides or angles of each orbit; the former ſtretching towards the internal canthus, and the latter towards the external angle of the eye. The bottom or back part of each orbit is formed by the ethmoid, ſphenoid, and a ſmall portion of the palate bones; and a ſmall part of the internal corner or angle of each orbit is filled up by the os unguis.

As this laſt mentioned bone, the os unguis, is ſometimes the ſubject of a very nice operation, it is particularly neceſſary for ſurgeons to be well acquainted with its ſtructure and ſituation. It is extremely thin and brittle, ſo that a perforation may be made in it with very little force, with leſs indeed than is commonly imagined; for as it is not thicker than fine paper, the point of a ſharp inſtrument is eaſily made to paſs through it. The internal ſurface of the os unguis, which in part covers the cells of the ethmoid bone, is ſomewhat rough; but its external ſurface is ſmooth, and conſiſts of two depreſſions or concavities divided by a ridge. This ridge forms the boundary of the orbit at the internal canthus of the eye: So that one of the depreſſions which we have mentioned of the os unguis, is found to form the very point or angle of the orbit; while the other concavity, which lies between this ridge and the naſal proceſs of the maxillary bone ſerves to lodge in its upper part, where it is largeſt, the lachrymal ſac, and below it protects the duct leading from this ſac into the noſe, where it terminates immediately below the ſuperior edge of the lower os ſpongioſum. The naſal duct of the lachrymal ſac admits a probe of the ſize of a crow's quill; and it continues of this diameter till within a little of its termination in the membrane of the noſe; where, by running in an oblique direction between the layers of this membrane, in a manner ſimilar to the termination of the ureters in the bladder, it is in general found contracted to a very narrow point.

The principal part of each orbit is filled by what is termed the Ball or Globe of the eye; a body which we find to be compoſed of ſeveral membranes or coats, incloſing fluids or liquors of different conſiſtences, improperly termed the Humours of the eye.

Anatomiſts have conſidered the coats of the eye as numerous, but there are only three which can be diſtinctly traced; namely, ly, the Sclerotic, the Choroid, and the Retina. The former has indeed been ſuppoſed to conſiſt of different coats, to all of which names have been appropriated, viz. The tunica albuginea, the cornea opaca, cornea lucida, &c. and even the choroid has been imagined to be formed of different tunics: But although a tedious maceration may ſeparate ſome of theſe parts into different lamellæ, the knife of the anatomiſt is not able to do ſo; and as diſtinctions of this kind can never tend to any uſeful purpoſe, they ought to be univerſally rejected.

The fat and different muſcles belonging to the eye being ſeparated from it, the ſclerotica is the firſt coat which preſents itſelf; and it is found to ſurround the whole globe of the eye, which is not the caſe with any of the other coats. In the anterior convex part of the eye, which in a healthy ſtate is always tranſparent, this membrane is in general termed the Cornea. The poſterior part of it being extremely firm and white, is alſo perfectly opake: It is this part of it which has commonly been termed Sclerotic, or, as we have already obſerved, the opake Cornea. But although the tranſparent cornea can be eaſily ſeparated into different laminæ, which cannot be ſo readily done with the other; a circumſtance which has led ſome anatomiſts to conſider them as diſtinct coats; yet as the one is evidently a continuation of the other, and as they are both ſupplied with and nouriſhed by the ſame blood-veſſels, there ſeems no good reaſon, as we have juſt remarked, for retaining this diſtinction.

All the opake part of the ſclerotica we find to be lined with the ſecond coat of the eye, the choroides, a dark, or duſky red coloured membrane, which every where adheres to it with firmneſs, particularly at a ſmall diſtance from the commencement of the tranſparent cornea, where a circular whitiſh ring is formed by this junction of the choroides with the ſclerotica, commonly termed the Ligamentum Ciliare. From this junction of the choroides with the ſclerotica, a perforated kind of curtain or ſeptum is produced, which from the variety of its colours is termed the Iris. The perforation in the centre of this membrane is termed the Pupil, and ſerves to admit the rays of light to the bottom of the eye.

Towards the middle of the iris, a number of radiated lines are obſerved, which run from the circumference to the centre: Theſe are denominated ciliary proceſſes, and on their action the contraction and dilatation of the pupil appears to depend; for it ſeems to be doubtful whether any circular fibres exiſt in the iris or not.

Ruyſch, as well as other anatomiſts, have imagined, that the tunica choroides conſiſts of two diſtinct coats, and the iris has been in general conſidered as a continuation of one of theſe; but latter diſcoveries tend to ſhow that the choroides in the human eye conſiſts of one ſimple indiviſible tunic, and that it is extremely different in every reſpect from the iris.

The third and moſt internal coat of the eye is the Retina, which ſeems to be an expanſion of the optic nerve. It does not line the whole cavity of the eye, but appears to terminate over the anterior edge of the ſac or capſule of the vitreous humour, which we ſhall afterwards have occaſion to deſcribe.

Viſion we ſuppoſe to be produced by the rays of light being applied in a certain manner upon the retina; it is therefore obvious, that a ſound ſtate of the optic nerve by which this membrane is produced, is abſolutely neceſſary for the purpoſes of viſion. And we conclude with much probability, that the nerve is ſound, when the uſual contraction and dilatation of the pupil takes place on light being applied to, or removed from the eye: for in a healthy ſtate of this organ, ſuch a connection occurs between the optic nerve and the iris, that the latter always contracts or dilates, juſt in proportion to the quantity of light thrown upon the former.

Theſe are all the proper coats or coverings of the eye; but there are two membranous expanſions which likewiſe cover a conſiderable portion of the back part of the globe, and which by many have been enumerated as part of its tunics; namely, the albuginea, which we have already mentioned, and the tunica conjunctiva: The former, however, conſiſts entirely of the tendinous attachments of the muſcles of the eye; and the latter is a continuation or reflection of the membrane which lines the internal ſurface of the eye-lids.

The cavity formed by theſe different coats or membranes, is filled with three kinds of ſubſtances or humours as they are commonly termed: namely, the vitreous; the cryſtalline; and the aqueous. All the poſterior part of the eye is filled with the vitreous humour, which is perfectly tranſparent, and of a gelatinous conſiſtence: This humour is completely ſurrounded by a very delicate membrane, which likewiſe appears to paſs through the ſubſtance of this gelatinous maſs, and to confine it in a kind of cellular texture or net-work. In the anterior ſurface of the vitreous humour, we find a depreſſion exactly oppoſite to the pupil, for the purpoſe of receiving the cryſtalline humour, a ſubſtance of a much firmer texture than itſelf, and of a rounded or lenticular ſhape. This body, or the Lens as it is commonly termed, is retained in its ſituation by a very fine membrane or capſule, which appears to be formed by the capſule of the vitreous humour, ſeparating or dividing at this part into two diſtinct laminæ. It has indeed been ſuppoſed, that the cryſtalline lens has a cyſt or capſule peculiar to itſelf; but I have never been able to diſtinguiſh it, nor has any ſufficient evidence ever been given of it.

The whole anterior part of the eye, from the termination of the vitreous and cryſtalline humours forward to the internal ſurface of the tranſparent cornea, is filled with the aqueous humour, a thin tranſparent fluid. By the iris, which we have already deſcribed, this part of the eye is divided into two unequal departments: The ſmalleſt of theſe, which is ſcarcely a tenth of an inch in width, and lies between the iris and the capſule of the vitreous humour, is termed the Poſterior Chamber; and the other, which is conſiderably larger, and occupies the whole ſpace from the iris to the cornea, is called the Anterior Chamber of the eye. Although theſe two diviſions of the eye, however, are in ſome parts perfectly diſtinct and ſeparate from each other, yet, in a healthy ſtate of this organ, it is evident they muſt always communicate at the pupil, the opening we have deſcribed in the centre of the iris.

The muſcles of the eye are ſix in number; namely, the levator oculi, the depreſſor, adductor and abductor, the obliquus ſuperior and inferior. By theſe all the motions of the eye are performed.—The five firſt ariſe from near the bottom of the orbit, at no great diſtance from one another; and the laſt originates from the orbitar proceſs of the maxillary bone near to its junction with the os unguis. They are all inſerted into the tunica ſclerotica, below the adnata or tunica conjunctiva.

The conſtant motion of the eye requiring it to be kept ſoft and moiſt, we find it plentifully ſupplied for this purpoſe by a fine tranſparent fluid, the tears. This ſecretion is now known to depend in a great meaſure upon a large glandular body, the glandula lachrymalis, ſeated immediately above the eye, in that depreſſion we formerly mentioned in the os frontis, near to the external angle of the orbit. We likewiſe find in the internal or great angle of the eye, a ſmall red coloured body, termed the Caruncula Lachrymalis, which till of late was ſuppoſed to be the principal origin of the tears. This, however, is not the caſe; and there is even reaſon to doubt whether this ſubſtance be of a glandular nature or not.

But although we ſuppoſe the tears to be chiefly ſecreted by the glandula lachrymalis, there is much reaſon to imagine that the quantity of this fluid is increaſed by exſudations from the whole ſurface of the eye, as well as from the membrane of the eye-lids. But this being in ſome meaſure foreign to our ſubject, we cannot at preſent enter farther upon the conſideration of it.

The eye, and its appendages, which we have juſt deſcribed, are ſupplied by ſeveral arterial branches, either directly from the internal carotid, or from the maxillary arteries. None of theſe, however, are of any conſiderable ſize; at leaſt, before they reach the eye, they are in general found to be divided into branches of no great magnitude: A circumſtance of ſome importance for practitioners to attend to: for, on the ſuppoſition of theſe arteries being larger than they really are, ſurgeons have commonly been deterred from operating with that freedom on the eye that they otherwiſe might do, particularly in the total removal or extraction of the eye-ball; an operation we ſhall afterwards have occaſion to conſider. The veins of the eye terminate partly in the external, and partly in the internal jugular veins.

Viſion, as we have already obſerved, depends in a great meaſure on the optic nerve which paſſes in from the brain at the bottom of the orbit; but the eye does not depend entirely upon this nerve: It receives branches from ſeveral others, particularly from the fourth, fifth, and ſixth pairs.

The globe of the eye, and the other parts contained in the orbit, are covered by two very moveable membranes, called Palpebræ, or Eye-lids, formed chiefly of the ſkin and a ſmooth fine membrane we have already mentioned, the tunica conjunctiva, with an intermediate thin cartilaginous body termed Tarſus, on which the cilia or eye-laſhes are placed. Both the upper and under eye-lids are ſupplied with this thin cartilage; at the extreme border of which, towards the roots of the cilia, we meet with a number of ſmall follicles, named after their diſcoverer, the follicles or glands of Meibomius; from whence is poured out a viſcid ſebaceous matter, commonly termed the gum of the eyes.

The motion of the eye-lids is performed entirely by two muſcles, the orbicularis palpebrarum, and the levator palpebræ ſu-

ſuperioris. The former is common to both the eye-lids: It originates by a tendon at the inner angle of the eye, and by fleſhy fibres from the orbitar proceſs of the maxillary bone, and is inſerted by a ſmall round tendon into the naſal proceſs of the ſame bone. A few of the tendinous fibres of this muſcle too are ſpread upon, and ſeem to be inſerted into, the anterior ſurface of the lachrymal ſac. The uſe of this muſcle is to draw the eye-lids together, and to compreſs the eye-ball.

The levator palpebræ ſuperioris originates from the bottom of the orbit, and is inſerted into the membranous and cartilaginous parts of the upper eye-lid: And the ſole purpoſe of it is to raiſe this covering of the eye.

We have already deſcribed the lachrymal ſac and duct, by which the tears are tranſmitted to the noſe: we have now to attend to the manner in which they are conveyed into the ſac. After the tears have been employed in lubricating the eyes, they would at all times be falling over the cheeks, if they were not carried off in ſome other manner: A very beautiful mechaniſm, however, is employed by nature for this purpoſe.

Near to the internal angle of each eye, two ſmall protuberances may be obſerved, one on the boarder or edge of the upper eye-lid, and the other exactly oppoſite to it on the under eye-lid. In the centre of each of theſe there is a ſmall hole or opening, termed Punctum Lachrymale, which we find to be the mouth of a ſmall conduit leading to the lachrymal ſac, and by which the tears are conveyed into it. Theſe canals are of ſuch a ſize as to admit a probe ſomewhat larger than a hog's briſtle. They are each of them about four-tenths of an inch in length; and after running in an oblique direction along the edge of the eye-lids, they commonly join into one common trunk immediately before they enter the lachrymal ſac, ſomewhat more than the tenth of an inch below the upper extremity of it.

The protuberances on which theſe canals

originate, are evidently irritable, as may readily be ſeen on their being touched with a probe or with any acrid application. This renders it probable that they are endowed with a power of abſorbing the tears; and this fluid we find is at all times plentifully applied to the mouths of them, by a kind of membranous production of the tunica conjunctiva, of a ſemilunar form, lying in the internal angle of the eye. This membrane is by anatomiſts termed the Valvula Semilunaris. In order, however, to render the anatomy of the parts we have laſt deſcribed as intelligible as poſſible, a circumſtance of great importance in the treatment of the diſeaſes to which they are liable, we have thought it right to give a delineation of them. Plate XXXI. fig. 1.

Being now prepared to enter upon the conſideration of the diſeaſes of theſe parts, we ſhall proceed accordingly to this part of our ſubject.

Inflammation of the eye frequently occurs, and is productive of other diſorders to which this organ is liable: We ſhall therefore enter firſt upon the conſideration of this affection, and ſhall afterwards proceed to treat of the following diſeaſes and operations in the order they are here mentioned, viz. Wounds of the eye-lids, and eye-ball ;—Tumours of the eye-lids, ſuch as abſceſſes, melicerous and ſteatomatous collections, warts, &c.—Inverſion of the cilia or eye-laſhes—Everſion of the eye-lids—Concretion of the eye-lids—Fleſhy excreſcences on the cornea—Abſceſſes in the globe of the eye—Dropſical ſwellings of the eye-ball—Blood effuſed in one or both of the chambers of the eye—Ulcers on the cornea—Specks or films on the tranſparent part of the eye.—Protruſion of the globe of the eye from the ſocket—Of cancerous affections of the eye, and extirpation of the eye-ball—Of artificial eyes.—Of cataracts, and the treatment of them by depreſſion and extraction—Obliteration of the pupils, by concretion of its ſides and adheſion of the iris to the capſule of the cryſtalline and vitreous humours—And, laſtly, of the fiſtula lachrymalis.

SECTION II.

Of Ophthalmia, or Inflammation of the Eyes.

THE eyes and their appendages, like every organiſed part of the body, are liable to inflammation; and the ſymptoms produced by this affection vary according to the particular ſeat of the diſeaſe. Thus the ſymptoms attending an inflammatory affection of the retina and other deep ſeated parts, are different from thoſe which occur from inflammation of the external coverings of the eye; and theſe again are very different from thoſe produced by an inflamed ſtate of the eye-lids.

The ſymptoms which moſt frequently take place in inflammatory affections of the eye, are, a preternatul redneſs of the adnata, owing to a turgeſcence of its blood-veſſels; pain and heat over the whole ſurface of the eye, attended with a ſenſation of ſome extraneous body between the palpebræ and the eye-ball: And in moſt inſtances there is a plentiful effuſion of tears. All theſe ſymptoms are commonly increaſed by motion of the eye or of its coverings, and likewiſe by expoſure to light. We judge too of the depth of the inflammation by the degree of pain produced by light being thrown upon the eye. When the pain produced by light is conſiderable, we have much reaſon to imagine that the parts at the bottom of the eye, and eſpecially the retina, are chiefly affected; and vice verſa, when the pain is not much increaſed by this kind of expoſure, we conclude with much probability that the inflammation is confined perhaps entirely to the external coverings of the eye. In ſuperficial affections of this kind, too, the ſymptoms are in general perfectly local; but whenever the inflammation is deep-ſeated, it is attended with ſevere ſhooting pains through the head, and fever to a greater or leſſer degree commonly takes place.

During the whole courſe of the diſeaſe there is for the moſt part a very plentiful flow of tears, which frequently become ſo hot and acrid as to excoriate the neighbouring parts; but it often happens, after the diſeaſe has been of ſome duration, that, together with the tears, a conſiderable quantity of a yellow purulent-like matter is diſcharged: And, when the inflammation has either ſpread to the eye-lids, or has been ſeated there from the beginning, ſo ſoon as the tarſi become affected, a diſcharge takes place of a viſcid glutinous kind of matter; which adds greatly to the patient's diſtreſs, as it tends to increaſe the inflammation, by cementing the eye-lids ſo firmly together as to render it extremely difficult to ſeparate them.

This is the appearance uſually exhibited by inflammation of the eyes in the firſt ſtages of the diſorder; but when the diſeaſe continues violent notwithſtanding the uſe of any remedies that may be employed, like inflammatory affections of other parts it proceeds to terminate either in ſuppuration,

tion, or in obſtruction or induration of ſome part of the membranes of the eye. Inflammation of the eyes has been known, too, to terminate in mortification; but this is a rare occurrence: And we even know that it does not readily proceed to ſuppuration, for reaſons which we have elſewhere entered more fully into the conſideration of*.

Inflammatory affections of the eyes are induced by a variety of cauſes: Whatever tends to produce inflammation in other parts, will be attended with ſimilar effects when exerted upon the eye; but the peculiar mechaniſm of this organ renders it liable to be acted upon by cauſes which may with impunity be applied to any other part of the body. Thus, much expoſure to ſmoke tends often to induce inflammation of the eyes: And this likewiſe happens from the application of much light; particularly from much expoſure to the rays of the ſun, to the influence of a large fire, or to the effects of ſnow: And the in-

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* Treatiſe on Inflammation and its Conſequences.

troduction of lime, ſand, or any other extraneous body, between the eye-lids and eye, is very univerſally attended with this effect.

The conſequences, however, of theſe cauſes are not in general very permanent; for in recent caſes of this nature, a removal of the cauſe is in moſt inſtances attended with the cure of the diſorder. It is thoſe inflammatory affections which originate from diſeaſes of the conſtitution which prove moſt obſtinate, and which are therefore moſt to be dreaded, particularly ſuch as occur from ſcrophula, and from lues venerea; for it is found by experience, that ſcarcely any ſymptom in either of theſe diſeaſes proves ever ſo tedious as thoſe inflammations of the eyes with which they are frequently attended. Whilſt a venereal or ſcrophulous affection ſubſiſts, it is in vain to expect a cure of thoſe inflammations of the eyes which appear to be produced by them. In every caſe therefore of this nature, ſuch remedies ought to be employed, as are known to prove moſt powerful for the removal of the diſeaſe of the conſtitution, at the ſame time that we attend to the local treatment of the diſorder of the eyes. It is the management of this local affection which we are at preſent to conſider.

In the treatment of inflamed eyes, the indications to be kept in view are, to remove any extraneous ſubſtances by which irritation may be produced on the eyes or on the eye-lids;—To diminiſh pain and irritability already induced—To remove the turgeſcence of the blood-veſſels of the eyes—And to prevent a return of the diſorder.

When it is found that inflammation is induced by the introduction of ſand, or any other extraneous body, between the eye-lids and eyes, the utmoſt attention ſhould be given to the removal of them. By due pains, the eye-lids may be ſo far ſeparated merely by the fingers of the operator, as to admit of a clear view being obtained over a very conſiderable portion of the eye-ball. But this will be done more effectually if an aſſiſtant, by means of a flat curved hook, ſuch as is repreſented in Plate XXIX. fig. 6. elevates the ſuperior, while the ſurgeon himſelf depreſſes the inferior eye-lid. Any extraneous body diſcovered by this means, if it is looſe, may be taken out by the end of a blunt probe covered with a bit of ſoft linen or ſilk; or if any ſharp-pointed ſubſtance is obſerved fixed on the eye, it may be removed with a pair of ſmall forceps.

It often happens, however, even when we are almoſt certain from the patient's feelings and other circumſtances, that the inflammation is kept up by ſome cauſe of this nature, that nothing can be diſcovered even on the moſt minute inſpection. In ſuch circumſtances ſome advantage is often derived from injecting, at proper intervals, quantities of tepid water or of milk and water between the eye-lids and eyes, by which ſand and duſt may often be waſhed out when they cannot be removed in any other manner: The eaſieſt and moſt effectual method of throwing in

theſe

PLATE. XXIX.

FIG. 1.

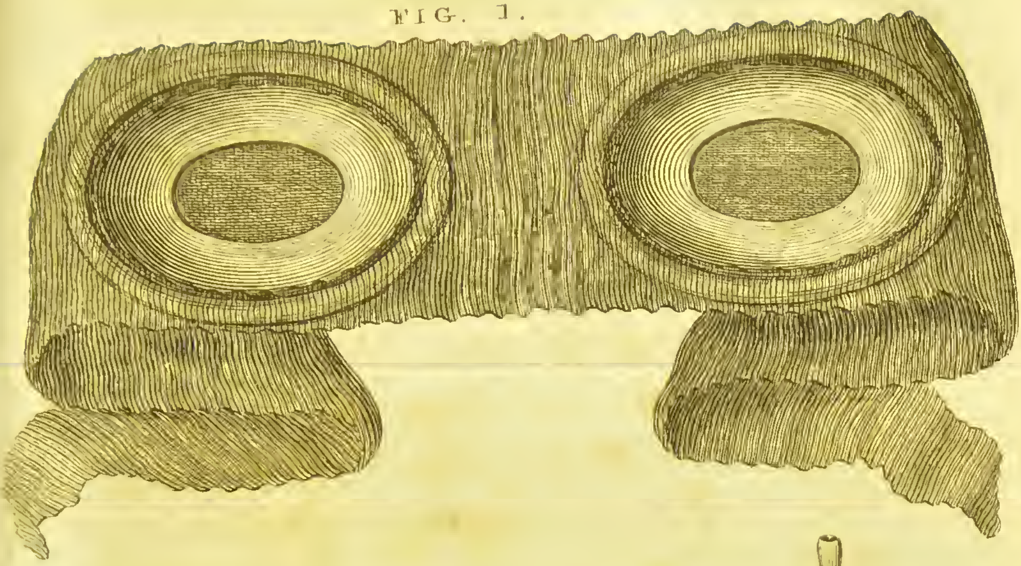


FIG. 2.

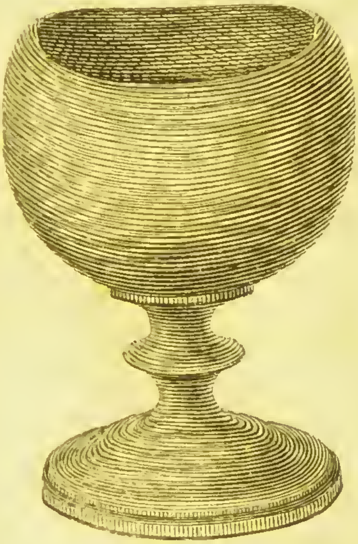


FIG. 3.

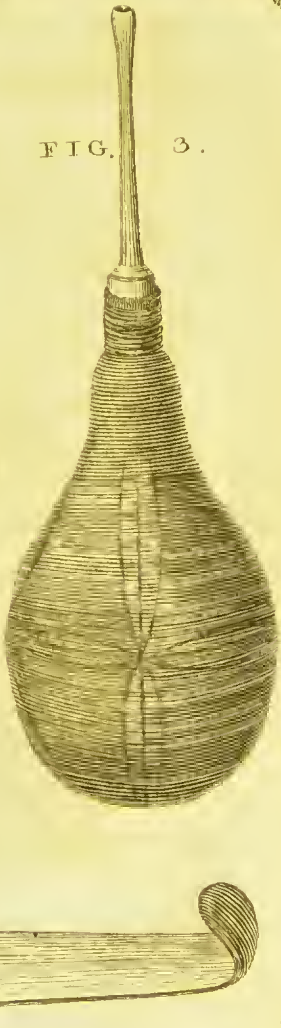


FIG. 4.

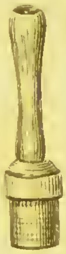


FIG. 5.

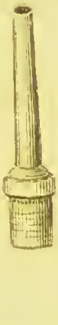
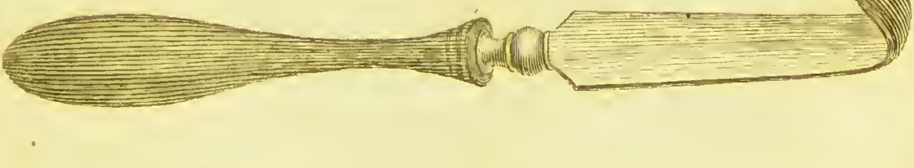


FIG. 6.



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theſe liquids, is by means of a ſmall bag of the elaſtic gum, fitted with a ſhort pipe of ivory, the point of which ſhould be inſinuated below the eye-lids. By means of this, a ſurgeon can eaſily perform all that is neceſſary without any aſſiſtance, which with a ſyringe he cannot ſo readily do. One of theſe bags properly mounted is repreſented in Plate XXIX. fig. 3.

In this manner, and by frequent dipping and bathing the eyes in warm water, they may in general be entirely cleared of all extraneous bodies: But when the inflammation has ſubſiſted for ſome time, it will often continue after the cauſe which produced it at firſt has been removed; in which event, other remedies muſt be employed. When the pain and inflammation are conſiderable, and have induced a fulneſs and quickneſs of pulſe, along with other ſymptoms of fever, it is ſometimes neceſſary to take away a conſiderable quantity of blood by one or more general evacuations. The bowels ſhould be kept open by briſk purgatives; a low diet ſhould be continued for a length of time in proportion to the violence of the diſeaſe, and to the ſtrength of the patient; the body ſhould be kept cool; light ſhould be excluded from the eyes, and they ſhould be kept conſtantly covered either with ſoft linen ſoaked in a watery ſolution of lead, or with cataplaſms applied cold, compoſed of this ſolution and crumb of bread. By theſe means it will often happen that inflammatory affections of a very violent nature will be effectually removed; but caſes frequently occur which reſiſt even a long continued uſe of them.

In ſuch inſtances, it has been found, that diſcharging blood from the neighbourhood of the parts affected, or even from the blood-veſſels of the eye itſelf, has often proved uſeful when every other means have failed. Indeed every general blood-letting ſhould in affections of this nature be practiſed on veſſels as contiguous to the eyes as poſſible; particularly on the jugular veins or temporal arteries; which laſt, as we have ſhown in a preceding part of this work, may at all times be opened with perfect ſafety. But when it is determined to diſcharge blood, either from the parts contiguous to the eyes, or from the veſſels of the eyes themſelves, the means we employ for this purpoſe are, cupping and ſcarifying the temples; leeches applied as near as poſſible to the eyes, and ſcarifying the blood-veſſels of the eye-balls or of the eye-lids. The operation of cupping and ſcarifying, we have already deſcribed, as alſo the beſt method of applying leeches *.

By one or other of theſe means, a great proportion of inflammatory affections of this nature may be removed; but in caſes of a more obſtinate kind, much advantage may be derived from ſcarifying the veſſels of the eyes, when no relief whatever is obtained from the diſcharge of blood in any other manner. As ſcarifying the veſſels of the eye, however, has always been conſidered as a very nice and delicate operation, it has not been ſo generally

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* Vide Volume I. Chap. III.

nerally practiſed as it ought to be; but any ſurgeon with a ſteady hand may at all times perform it with perfect ſafety, and without any kind of riſk of injuring the eye itſelf.

Various methods have been propoſed for dividing the veſſels of an inflamed eye. It has been attempted with a bruſh compoſed of the beards of barley, whoſe ſharp ſpiculæ being drawn acroſs the part to be ſcarified, a number of its veſſels are thus penetrated and divided. This was firſt put in practice by a famous Engliſh Oculiſt Mr Woolhouſe, about the beginning of this century, and was ſuppoſed to prove more effectuall than the means which till then had been in uſe for this purpoſe from the days of Hippocrates and Celſus; which were, rubbing the parts to be ſcarified, either with a piece of rough pumice-ſtone, or with the ſpiculæ of different ſpecies of thiſtles, till the blood-veſſels were ſufficiently lacerated for diſcharging as much blood as was neceſſary. It has likewiſe been propoſed to raiſe or elevate the veſſels to be divided, with the point of a needle, and then by means of a pair of ſciſſars, or with a ſcalpel, to cut them acroſs.

All theſe modes, however, of ſcarifying the eye are evidently founded on timidity; they give a great deal of unneceſſary pain, and do not prove ſo effectual as ſcarifications made with a ſharp cutting inſtrument. Practitioners have commonly been afraid of attempting it with an inſtrument of this kind; but any perſon accuſtomed to chirurgical operations will ſoon find that it may be done with perfect eaſe and ſafety. In the hands of a ſteady ſurgeon the ſhoulder of the common lancet anſwers very well for this purpoſe. But with a view to prevent any riſk of the eye-lids being injured by one edge of the inſtrument while the other is employed in ſcarifying the eye itſelf, I have delineated a ſmall knife in Plate XXXI. fig. 3. which I have long uſed for this purpoſe.—It is nearly of the ſhape of a lancet; but being blunt on the back, the objection I have mentioned to that inſtrument is thus effectually obviated.

In this operation the only aſſiſtants that are neceſſary is one to ſtand behind the patient to ſupport and ſecure the head, and another to ſecure the hands with a view to prevent any interruption to the operator. This being done, the ſurgeon, with the fore and middle finger of one hand muſt ſeparate the eye-lids, ſo as to expoſe as much of the eye-ball as poſſible; whilſt, with the inſtrument we have mentioned in the other, he is to divide as many of the inflamed veſſels as appears to be proper. This is moſt effectually done by ſmall ſcarifications being frequently repeated in different parts of the eye-ball, or of the internal ſurface of the eye-lids when they are much affected. In general, we wiſh to avoid the tranſparent cornea in this operation, and to confine the ſcarifications to the albuginea or cornea opaca; but when the veſſels of this part of the eye are much diſtended with blood, even they may be divided with perfect eaſe and ſafety.

PLATE. XXX.

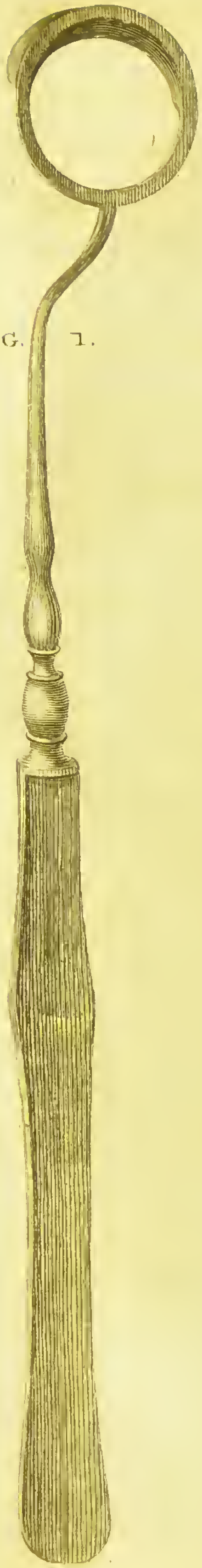


FIG. 1.

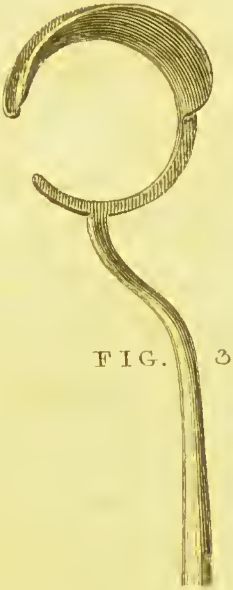


FIG. 3.

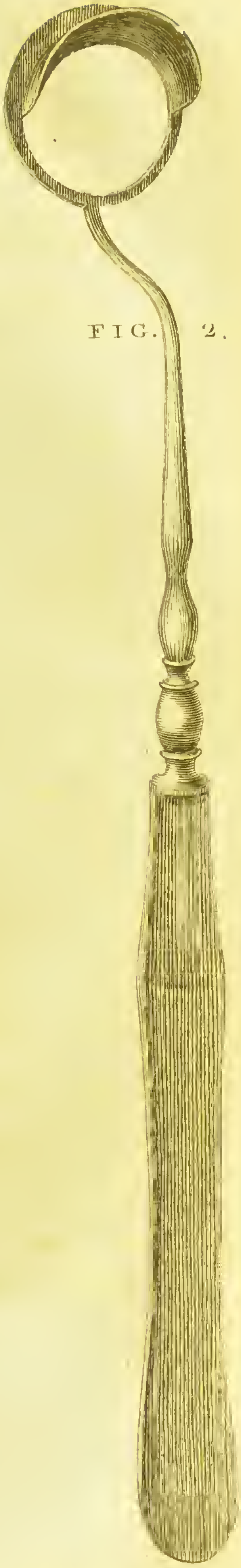
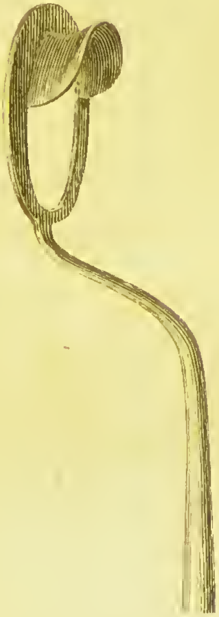


FIG. 2.

FIG. 4.



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ty. I have frequently found it neceſſary to practiſe ſcarifications on the anterior part of the eye, and I never obſerved any inconvenience to proceed from them.

After as many of the blood-veſſels of the inflamed part have been divided as appear to be neceſſary, we ought to endeavour to make them diſcharge their contents as freely as poſſible: For which purpoſe the eye ſhould be frequently dipped in warm water, or, ſoft linen that has been newly immerſed in warm water ſhould be kept conſtantly applied to it.—By this means a good deal of blood may be evacuated; and we know from repeated experience of its effects, that a few drops diſcharged from an inflamed part, prove frequently more effectual in removing inflammation than a conſiderable quantity taken from a diſtant part of the body.

A plentiful diſcharge of blood from the veſſels of the eye itſelf gives frequently more relief in that great degree of pain of which patients in this diſeaſe ſometimes complain, than any other means that can be employed. But when this either fails in the removal of pain, or is not ſubmitted to by the patient, opiates applied directly to the eye often afford much relief. A few drops of a ſtrong ſolution of opium in water being dropped into the eye when the pain is ſevere, proves ſometimes ſucceſsful in the removal of it; but the common laudanum of the diſpenſatories, particularly when wine is employed as the menſtruum, will in many inſtances prove effectual when the watery ſolution of opium is not found to anſwer.

This ſymptom, as well as every other produced by inflammation of the eyes, is frequently relieved too by ſhaving the head and waſhing it frequently in cold water. Bliſters applied to the head, behind the ears, or on the neck, are on ſome occaſions alſo employed with advantage; as are likewiſe drains, induced either by ordinary pea-iſſues, or by a cord in the back part of the neck.

In the diſtreſſing ſtate to which thoſe are reduced who labour under ſevere affections of this nature, every circumſtance merits the attention of practitioners from which any relief can be derived. In ſome ſtages of the diſorder, a great deal of uneaſineſs is experienced from a thick viſcid ſecretion, which glues the eye-lids ſo cloſely together, eſpecially in the mornings, as always requires much trouble, and frequently ſome pain to ſeparate them. This takes place in a greater or leſſer degree in almoſt every variety of ophthalmia, but particularly when the tarſi or extreme borders of the eye-lids are much inflamed. In this ſpecies of the diſeaſe, indeed, it often happens, that the inflammation ſoon terminates in a great number of ſmall ulcerations, which very commonly with the aſſiſtance of a magnifier, and ſometimes by the naked eye alone, may be diſtinctly obſerved round the whole circumference of the cartilaginous border of the eye-lids.— From theſe the viſcid matter we have mentioned, which appears in ſome meaſure to be produced by the ſebaceous glands of theſe parts, is poured out in great quantities; and unleſs ſome means be employed for the cure of the ulcers, ſcarcely any remedy will have much effect on the inflammation of the eyes.

It often happens, that a little of any emollient ointment being inſerted between the eye-lids every night before going to reſt, will prove highly ſerviceable by preventing this glutinous kind of matter from fixing them ſo firmly together; but the relief obtained in this manner is in general only temporary. Some addition muſt be made to the emollient for the purpoſe of healing the ulcers from whence the matter is diſcharged, otherwiſe no permanent advantage is to be expected from it; and when the diſorder is entirely local, and not connected with ſcrophula or ſome other affection of the conſtitution, the cure of theſe ulcers will very commonly be followed by a perfect cure of the inflammation by which they were at firſt produced. With this view, a calx ofzinc, or lapis calaminaris finely levigated, and added to an equal quantity of an emollient ointment compoſed of wax and oil, will often be found to prove ſerviceable: but no application proves ſo certainly uſeful in every caſe of this nature as ointments of the mercurial kind; and the moſt effectual of theſe appears to be the unguentum citrinum of the Edinburgh Diſpenſatory, mixed with an equal quantity of pure hog's lard; or the blue mercurial ointment of different diſpenſatories, prepared with quickſilver triturated with an emollient ointment. One ounce of quickſilver, effectually triturated with four ounces of axunge, makes for this purpoſe a very uſeful application. Every night and morning the ulceration on the eye-lids ſhould be covered with a little of this by means of a pencil, at the ſame time that a ſmall portion of the ointment ſhould be inſinuated between the upper and under eye-lids; and a weak ſaturnine or vitriolic ſolution ſhould be employed once or twice daily to bathe the parts.

By theſe means being duly proſecuted, and by preſerving the eyes from the effects of light ſo long as it proves offenſive to them, it will rarely happen, unleſs when the diſorder has been neglected at firſt, or connected with ſcrophula or lues venerea, that a cure is not at laſt effected. In every diſeaſe of this kind, however, it is neceſſary to avoid the admiſſion of light to the eyes, not merely during the continuance of the inflammation, but as long as it creates any degree of pain: And even when one eye only is affected, care ſhould be taken to keep them both covered; for we know from daily experience, that the expoſure even of a ſound eye to the effects of light, while the other is in a ſtate of inflammation, almoſt conſtantly proves hurtful to both.

The eyes, however, ought not to be kept cloſely tied down, as is too frequently done. In every caſe of inflammation this does much miſchief, by keeping them too warm. They ſhould be very lightly covered with a looſe bandage either of ſilk or ſoft linen; and when the patient is able to walk a little abroad, before his eyes can bear a free admiſſion of light, the bandage repreſented in Plate XXIX. fig. 1. frequently proves uſeful: By means of it the quantity of light to be admitted to the eyes can be eaſily regulated, whilſt at the ſame time the eyes themſelves are neither compreſſed nor kept warmer than is neceſſary.

By a cautious plan of treatment, ſuch as we have mentioned, being continued for a longer or ſhorter period, according to the circumſtances of the caſe, and to the ſtrength and age of the patient, a great proportion of inflammatory affections of the eye will at laſt be removed, unleſs where the complaint proceeds, as we have already obſerved, from ſome general affection of the conſtitution; in which caſe, no rememedy will prove altogether effectual for the diſeaſe of the eyes till the diſorder of the ſyſtem is removed.

With a view to prevent a return of an inflamed ſtate of the eyes, various remedies have been recommended, particularly waſhes and other applications of an aſtringent nature: It rarely happens, however, that any of theſe have much effect; and if they are ever made too ſtrong with vitriol, or any other irritating body, they are very apt to do miſchief. Whilſt the inflammation of the eyes continues, applications of this nature, particularly thoſe of the ſaturnine kind, both by themſelves and when conjoined with a ſmall proportion of white vitriol, frequently prove uſeful; but they do not appear to have any effect in preventing a return of inflammation. For this purpoſe, nothing I have ever employed proves ſo certainly uſeful as cold bathing, not only of the whole body, but of the head, and eſpecially of the eyes themſelves. By keeping the head ſhaved, and immerſing it daily in cold-water, much may be done in preventing thoſe frequent returns of inflammatory affections of the eyes, to which many people are liable. For the purpoſe of applying local bathing to the eyes different means have been propoſed; but the moſt ſimple and moſt effectual of all of them is by means of a cup repreſented in Plate XXIX. fig. 2. By filling this cup, which ſhould be of an oval form and ſomewhat larger than the eye, with water or any other liquid, and preſſing the eye in upon it, if in this ſituation the eye-lids are opened and moved about, the whole ſurface of the eye may be thus effectually bathed. As a preventative too of this diſorder, a liberal uſe of Jeſuits bark has often been of ſervice; and we know from experience, whenever inflammation of the eyes returns periodically, that this is almoſt the only remedy to be depended on. We need ſcarcely obſerve, too, that whenever any cauſe is diſcovered by which the diſeaſe appears to be excited, to avoid this is abſolutely neceſſary; and unleſs this circumſtance be attended to, that nothing will ever prove effectual in preventing it.

SECTION III.

Of Wounds of the Eye-lids and of the Eye-ball.

AS the management of wounds will make the ſubject of another chapter, it may be conſidered as rather out of place to enter upon any part of it at preſent; but the anatomical deſcription we have given of the eye, renders it ſufficiently proper in this place to proceed to treat of every affection to which this organ is liable.

In wounds of the eye-lids, the parts may be divided either in a longitudinal, or in a tranſverſe direction, with reſpect to the courſe of their muſcular fibres. If the ſkin only be divided, or if a wound, penetrating the whole ſubſtance of the eye-lid, be inflicted in ſuch a manner as merely to ſeparate the fibres of the orbicularis muſcle from one another, all that is neceſſary to be done in the treatment of it, is to draw the ſkin and other parts that are divided as exactly together as poſſible, and to retain them in this ſituation by ſmall ſlips of adheſive plaſter. As in ſuch circumſtances no retraction can occur of the divided parts, they are eaſily retained together in the manner we have mentioned; and care ſhould be taken that they are kept in this ſituation till they are firmly united.

But when the orbicularis muſcle is divided in a tranſverſe direction, and eſpecially when a correſponding part of the tarſus or cartilaginous border of the eye-lid is likewiſe divided, more attention is neceſſary in retaining them: If they are allowed to ſeparate much from one another, ſuch a laxity of the eye-lid is apt to occur as prevents it from performing its uſual motions with facility: And again, if the divided parts are drawn too tightly together, the eye-ball itſelf is apt to ſuffer by the parts which ought to move eaſily upon it being rendered too tight and firm for this purpoſe.

In tranſverſe wounds of this nature, in order to retain the parts in their ſituation, it is neceſſary to employ a ſuture, or perhaps two if the wound runs nearly acroſs the eye-lid. The common interrupted ſuture is uſually employed for this purpoſe; but as the quilled ſuture anſwers better, it ought to be preferred. As we have deſcribed the method of performing theſe ſutures in the firſt volume of this work we have at preſent only to remark, that in the practice of either of them upon the eye-lids, a good deal of nicety and delicacy is required, otherwiſe much detriment may enſue, not only to the parts immediately operated upon, but to the eye-ball itſelf. When the quilled ſuture is employed, the pins to be made uſe of ſhould be ſhort and very thin, ſo as to run as little riſk as poſſible of injuring the contiguous parts. In the introduction of them, care ſhould be taken to make them paſs not only through the ſkin, but into the fibres of the orbicularis muſcle, otherwiſe little advantage will be gained by the operation: But there is no neceſſity for carrying them entirely through the inner membrane of the eye-lid. This would irritate and inflame the eye; and as it is not in any reſpect neceſſary, it ought to be avoided. If the ſkin is retained properly in its ſituation with a few of the fibres of the muſcle underneath, a better cure will be obtained than if the needles were made to paſs through the whole ſubſtance of the eye-lid; for in this manner the action of the muſcle is preſerved, whilſt no riſk is incurred of the eye-lid being too much contracted; a circumſtance very apt to occur when the whole thickneſs of the eye-lid is penetrated by one or more ſutures.

It is almoſt unneceſſary to obſerve, that in order to inſure ſucceſs from any of theſe operations, the motion of both the eyes ſhould be as effectually prevented as poſſible, otherwiſe no union of the divided parts will be obtained. Irritation will be produced on the eye itſelf; inflammation will occur; and this will render it neceſſary to remove the ſutures before they have effected the purpoſe for which they were employed.

Immediately after the ſutures are finiſhed, the eye-lids ſhould be cloſed and covered with a piece of ſoft linen ſpread with Goulard's cerate, in order to preſerve the parts in as ſoft and eaſy a ſtate as poſſible; and a compreſs of ſoft lint being laid over it, and another over the ſound eye, the whole ſhould be retained by a napkin tied over the head, in ſuch a manner as to preſs equally and gently upon both eyes. Inflammation ſhould be guarded againſt; or if preſent, it muſt be removed by the means recommended in the laſt ſection: And in the courſe of three days from the ſutures being introduced, they ought all to be removed; for in this period, if the parts have been kept in contact, their union will be completely effected.

We have hitherto been ſuppoſing that the parts are only ſimply divided; and when replaced, that the eye is found to be as completely covered as before: But it ſometimes happens here, as in other parts of the body, that the parts are not only divided but deſtroyed; in which caſe, when ſuch a conſiderable portion of the eye-lids are totally removed, as to prevent the remaining parts from being brought into contact without impeding the motion of the eye, it will be more prudent to leave them at ſome diſtance from one another; and by treating them with light eaſy dreſſings, to truſt to nature for ſupplying the deficiency by a new production of cellular ſubſtance.

The mechaniſm of the eye-lids is extremely well adapted for the purpoſe of protecting the parts beneath from too free an admiſſion of light, air, duſt, &c ; but no poſſible ſtructure could prevent their ſuffering from injuries of a different nature: And accordingly we find that the eye-ball is liable like other parts of the body to wounds, contuſions, &c.

As the bones at the bottom of the orbit are in ſome parts extremely thin, wounds of the eye which penetrate deep are frequently found to prove dangerous from the near contiguity of the brain : But wounds of a more ſuperficial nature which penetrate only the anterior part of the eye, although they may deſtroy the beauty and utility of the organ, are not in other reſpects to be conſidered as hazardous. Wounds of this part, however, of whatever nature they may be, at all times require our moſt ſerious attention ; not only with a view to the preſervation of ſight, but in order to prevent or obviate the effects of inflammation, a ſymptom with which they are very commonly attended.

Wounds of the tranſparent cornea, when directly oppoſite to the pupil, are moſt frequently productive either of a total or of a partial loſs of viſion; for the cicatrix which enſues from a wound of this part very commonly remains opake during the life of the patient: But although in this reſpect wounds of the anterior part of the eye are always to be dreaded, yet they are not uſually attended with ſo much inflammation as wounds of a ſimilar extent of the ſclerotica or opake cornea.

If the effects of wounds of the eye are found to be different according to their ſituation, they are much more ſo with reſpect to their extent; and in this too the peculiar ſtructure of the eye renders them very different from wounds in almoſt every other part of the body. In other parts of the body, we know that in general a ſmall punctured wound is more to be dreaded than a cut of much greater extent; but in the eye, the riſk with which wounds are attended is moſt frequently in proportion to their extent; a circumſtance which long experience has now rendered certain, and which ought to have a conſiderable effect with ſurgeons in determining the preference to be given to the different operations performed upon this organ. It is not the pain produced by wounds which we here allude to, and which frequently occurs to a greater degree from mere punctures than from very extenſive cuts; but it is the riſk which large wounds induce of diſcharging the different humours or contents of the eye, by which viſion, if it be not entirely deſtroyed, muſt at leaſt be greatly injured; and by which in many inſtances the eye is ſo much diminiſhed as to ſink almoſt to the very bottom of the orbit: We ſhall afterwards, however, when treating of Cataracts, have occaſion to enter more fully upon the conſideration of this ſubject.

The circumſtance of moſt importance in the treatment of wounds in the eye-ball, and to which all our attention ought to be di-

directed, is the prevention or removal of inflammation. If the coats of the eye are ſo extenſively divided as to admit of any conſiderable part, or of all the humours being evacuated, it is not in the power of art to prevent it; for if a large opening is formed in any part of the eye, the natural and uſual action of the muſcles with which it is furniſhed, will for certain diſcharge or preſs out a great proportion of its contents: But in every wound of the eye, practitioners have much in their power, not only in the prevention of inflammation, but in the removal of this ſymptom when it has once taken place. As we have entered fully, however, into the conſideration of this ſubject in the laſt ſection, we muſt now refer to what was then ſaid upon it.

In wounds of the eye-ball, the ſtructure of the parts renders it impoſſible to diminiſh the extent of the openings produced by them, by the practice which we recommended in wounds of the eye-lids; namely, the placing of the divided parts in contact with one another, and retaining them till they are united either by ſutures or by adheſive plaſters. But as nothing of this kind is here admiſſible, all that art can in ſuch caſes attempt, is, together with a ſtrict antiphlogiſtic courſe, to keep the eye lightly covered with ſome emollient application of the ſaturnine kind, ſuch as Goulard's cerate, and to bathe it in now and then with a watery ſolution of lead. And when pain occurs in any conſiderable degree, as in wounds of the eye it frequently does, opium ſhould be given in doſes proportioned to the violence of it.

When a wound is very extenſive, ſo as to effect a complete evacuation of all the contents of the eye, a permanent blindneſs, with a conſiderable deformity induced by the ſinking of the eye-ball, will be almoſt the certain conſequence: But in wounds of leſſer extent, a due attention to the circumſtances we have mentioned, will frequently effect a total removal of ſymptoms which at firſt appeared in the higheſt degree formidable.

SECTION IV.

Of Tumours of the Eye-Lids.

THE eye-lids are frequently infeſted with ſmall tumours, which by impeding their motion, and by rubbing upon the globe of the eye, become in many inſtances ſo very troubleſome as to require the aſſiſtance of ſurgery for their removal.

The contents of theſe ſwellings are various, and therefore the tumours themſelves are found to be of different degrees of firmneſs. Towards the internal angle of the eye, and moſt frequently on the under eye-lid near to the lachrymal punctum, many people are liable to frequent returns of a ſmall encyſted tumour of the inflammatory kind, in this country commonly termed the *Stye* *. It begins with a ſenſation of fulneſs, ſtiffneſs, and uneaſineſs in the internal canthus of the eye. At firſt the ſkin is ſcarcely if at all diſcoloured; but if the tumour proceeds to ſuppupuration, which it always does, if means are not employed to prevent it, it becomes firſt of a pale red, and afterwards of a yellow complection towards the upper part of it, where it commonly burſts and diſcharges a ſmall quantity of thick purulent matter. This ſpecies of ſwelling, as we have ſaid, originates evidently from inflammation; and from the account we have given of it, ought clearly to be conſidered as a common boil or abſceſs. The only circumſtances in which it differs from boils in other parts of the body, are, the colour of the ſkin not being of ſuch a deep red during the inflammatory ſtage of it, and its advancing more ſlowly to ſuppuration. This, however, is evidently owing to the peculiarity of its ſituation; for the matter in theſe tumours being ſeated between the tarſus and the internal membrane of the eye-lid, the firmneſs of the cartilage prevents the ſkin which covers it externally from being much diſcoloured, at the ſame time that the preſſure produced by it may probably have ſome influence in preventing,

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* This is a variety of the Hordeolum of Mr Sauvages and other noſologiſts.

ing, or rather in retarding, the progreſs of that effuſion which we know to be neceſſary for the formation of pus.

Theſe are the tumours we meet with moſt frequently upon the eye-lids; there are others, however, which often occur, and from whence a good deal of diſtreſs is occaſionally experienced. By different authors a great variety of theſe has been deſcribed, but no real utility is derived from this. And as no beneficial purpoſe can be obtained from enumerating any diſtinction that does not point out ſome variety of practice, it is this conſideration only by which we are to be directed in mentioning the varieties of the diſeaſe we are to treat of.

The inflammatory tumours already deſcribed are moſt commonly ſituated towards the internal canthus of the eye; all the others to which the eye-lids are liable are met with indiſcriminately in every part of them. They are of three kinds, all of them differing from each other in their degree of firmneſs, and requiring a different method of treatment.

The firſt we ſhall mention is commonly of a roundiſh form; is ſomewhat ſoft or compreſſible; it ſeems to move or roll when preſſed upon; the ſkin retains its natural appearance; and from the contents of it when laid open being univerſally of a white fatty nature, we properly enough term it a Steatoma. The ſoft white matter, of which tumours of this kind is compoſed, is always ſurrounded with a firm membranous cyſt.

From different parts both of the upper and under eye-lid, we frequently obſerve ſmall pendulous tumours or excreſcences to hang by very narrow necks; whilſt on other occaſions they are connected to the ſkin by means of thin though broad baſes. Some of theſe excreſcences being of a ſoft fleſhy conſiſtence, are termed Sarcomatous tumours; whilſt others being hard, and on ſome occaſions even approaching to the firmneſs of horn, are denominated Verrucæ, or Warts.

In the treatment of thoſe inflammatory tumours or ſmall boils which occur ſo frequently towards the internal angle of the eye, ſome doubt has occurred reſpecting the propriety of endeavouring to bring them to ſuppuration; and by many it is even ſaid, that we ought in perhaps every inſtance, by means of vitriolic and other aſtringent applications, to attempt to cure or remove them by reſolution or diſcuſſion. The moſt material reaſon, however, that can be given for this, is, the trouble which attends the contrary practice of bringing them to ſuppuration: but when we conſider the advantages which reſult from this, and the hazard of injuring the eye-lids by frequently attempting to repel what nature wiſhes to diſcharge, we will not heſitate in the choice of our method of cure. By bringing theſe tumours to ſuppuration, we do indeed incur ſome additional trouble; but this is by no means conſiderable: and as ſoon as matter is fully formed, if it does not burſt and diſcharge itſelf, opening the tumour by the point of a lancet procures complete relief, and the ſore commonly heals quickly of itſelf without any farther trouble.

In every caſe, therefore, of this nature, as ſoon as it is evident that the diſeaſe is clearly formed, we ought by warm emollient poultices frequently renewed, to endeavour to bring forward a ſuppuration as quickly as poſſible, and then to diſcharge it in the manner already mentioned, if the tumour does not previouſly burſt of itſelf. I know from experience that this practice is perfectly ſafe; that the pain attending it is very inconſiderable; that it removes every riſk of tumours of a harder and more inveterate nature forming in the ſite of theſe inflammatory affections; and which I have obſerved in different inſtances to be the conſequence of a contrary management. After boils of this kind have ſuppurated and diſcharged their contents, bathing the parts with a weak ſaturnine ſolution or with ſome other aſtringent is highly proper: It tends to remove any uneaſineſs which may remain, and to reſtore the parts to their uſual tone.

In thoſe encyſted tumours again of the ſteatomatous kind, as well as in theſe excreſcences we have mentioned of a fleſhy or warty nature, as we can have no dependence on removing them by ſuppuration, as ſoon as they begin to impede the motion either of the eye or of the eye-lids they ought immediately to be removed by exciſion. As long as affections of this nature continue of a ſmall ſize, they are for the moſt part inoffenſive, and are therefore generally overlooked; but whenever they acquire any conſiderable magnitude, they ought by all means to be taken off.

In all warty excreſcences of a ſmall ſize, and in ſimilar affections of a ſoft fleſhy nature, we are commonly directed to remove them by the application of ſtrong cauſtic; or if their baſes are very ſmall, to attempt to do it by ligature. This, however, is a practice which ought not to be recommended; and no apology indeed can be offered for it but timidity either on the part of the patient or of the operator: From the nature of the remedy it muſt neceſſarily prove tedious. Painful and troubleſome inflammatory affections have been induced both by the uſe of ligatures and of cauſtic: And the diſtreſs produced by them is in every reſpect more conſiderable than what commonly occurs when the ſcalpel is employed. We ought therefore, in the removal of theſe tumours, to depend ſolely upon exciſion; an operation which in matters of this kind is neither difficult nor dangerous.

The patient being ſeated oppoſite to a window, and his head being ſecured by an aſſiſtant, if the tumour is not large enough to be laid hold of by the fingers, a ligature ought either to be paſſed round it, or puſhed through the centre of it by means of a needle, in order to enable the operator to raiſe it by pulling it gently from the parts beneath: and this being done, if the baſis of the tumour is narrow, it may be ſeparated by one ſtroke of the ſcalpel; but if it is attached in any conſiderable extent to the neighbouring parts, it is better by ſlow diſſection to enſure its total removal, than by proceeding quickly to run any riſk of allowing part of it to remain, or to require any farther trouble afterwards in removing it. On the operation being finiſhed, the only dreſſing which in general is found to be neceſſary, is a ſmall piece of ſoft lint to be retained by a ſlip of adheſive plaſter; and the ſore very commonly heals eaſily without any farther trouble.

When, again, we have to remove a tumour of the ſteatomatous or encyſted kind, inſtead of diſſecting off the ſwelling covered with the ſkin which ſurrounds it, by which a troubleſome unſeemly cicatrix is always produced, it anſwers the purpoſe much more effectually merely to divide the ſkin and cellular ſubſtance covering the ſwelling, by a ſimple inciſion with a common ſmall ſcalpel. This ſhould be done from one ſide of the tumour acroſs the moſt prominent part of it to the other; and a ſtrong waxed thread being paſſed through the centre of the cyſt, this ſhould be given to an aſſiſtant for the purpoſe of ſeparating or raiſing it from the parts beneath: The ſurgeon himſelf, too, by cautious diſſection, ſhould endeavour to ſeparate the ſkin and cellular ſubſtance from the whole circumference of the cyſt; and this being done, the tumour will be eaſily removed by the ligature attached to it.

If the tumour has been ſo ſituated as to render it neceſſary in removing it to make an inciſion through the internal membrane of the eye-lid, no dreſſing can with propriety be applied to the ſore, as the moſt inoffenſive remedy of this kind we could employ would tend to irritate and inflame the globe of the eye. All that we can do therefore in ſuch circumſtances, is, to lay the lips of the ſore as nearly together as poſſible; and to take care to remove as frequently as is neceſſary any ſuperfluous matter that may happen to form in it. But when, in the removal of tumours of this kind, it is found neceſſary to divide the external coverings of the eye-lids, in order to render the cicatrix as neat as poſſible,

ſible, the lips of the wound ſhould be drawn together by the fingers, and retained in their ſituation by ſlips of adheſive plaſter till their union is accompliſhed.

In the extirpation of theſe tumours, when the cyſt is tolerably firm, and their contents found to be of the ſteatomatous kind, the cyſt ought to be preſerved entire, as in this ſtate it is more eaſily and more effectually removed by doing ſo than in any other manner: But whenever the cyſt is thin, and eſpecially when the contents of it are found to be fluid by a ſuppuration having taken place in any part of it, which is not unfrequently the caſe, it is commonly very difficult, and in ſome inſtances impoſſible, to ſeparate the teguments from the cyſt beneath, without laying the cyſt open. In this caſe, after dividing the ſkin and cellular ſubſtance in the manner we have directed, by making an inciſion acroſs the moſt prominent part of the tumour, it is better to open the cyſt at once by a large puncture with the point of the ſcalpel in order to diſcharge the matter contained in it, than to make any attempt, as is commonly done, to preſerve it entire; which in ſuch circumſtances always renders the operation much more tedious than it otherwiſe would be.

SECTION V.

Of Inverſion of the Cilia, or Eye-Laſhes *.

THE eye-laſhes are in ſome inſtances ſo much inverted, or turned inwards upon the eye, as to create much pain and inflammation by rubbing or fretting the coats of it: in which caſe we are under the neceſſity of attempting by ſome means or other to remove them.

The inverſion of the cilia we find to depend upon different cauſes: In ſome caſes it proceeds entirely from a derangement of the hairs themſelves, which leaving their uſual direction turn in towards the eye-ball: But it is more frequently produced by a cauſe of a more obſtinate and more diſtreſſing nature, an inverſion of the tarſus or cartilaginous boarder of the eye-lid, which is moſt commonly induced either by ſome unequal ſpaſmodic affection of the orbicularis muſcle in the under eye-lid; for this diſorder is ſeldom met with in the upper palpebra; or it occurs as the effects of ſome cicatrix formed upon the ſkin of this part, occurring as the conſequence of wounds, or of abſceſſes which form upon it. In ſome inſtances, too, it is evidently produced by tumours preſſing the eye-laſhes in upon the eye; and a relaxation of the external teguments of the eye-lid has likewiſe been ſuppoſed to induce it. As the cauſe of the diſeaſe is various, ſo it is evident that the means of cure muſt likewiſe be ſo.

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* The Trichiaſis and Entropium of authors.

When it is found to originate ſolely from a derangement of the cilia themſelves, without any inverſion of the eye-lids, we are directed by authors, in the firſt place, to pull all the inverted hairs out with a pair of ſmall pliers; and with a view to prevent their growing again, we are deſired to burn the roots of each of them, either with lunar cauſtic, or with the point of a red-hot needle or wire: Nay, ſome have gone ſo far, as to propoſe that the whole cartilaginous edge of the eye-lid in which the hairs are placed, ſhould be entirely deſtroyed with cauſtic. The pain and inflammation of the eye induced by an inverſion of the cilia, is in ſome inſtances indeed ſo extremely diſtreſſing, and it is ſo impoſſible by any other means to procure a remedy than by preventing them from rubbing upon the eye, that none who have had opportunities of obſerving the obſtinacy of ſuch affections will be ſurpriſed at the great attention with which they have been treated by almoſt every author who has wrote upon this ſubject: but it fortunately happens, that none of the remedies we have mentioned, which are both extremely painful and terrifying, are in any reſpect neceſſary; for the ſame intention may in almoſt every inſtance be accompliſhed by means of a much more ſimple nature.

When the eye-laſhes have remained for any conſiderable time in a deranged ſtate, and have therefore acquired their full ſtrength and elaſticity, it is altogether impoſſible to bring them again into a proper direction. In ſuch circumſtances, therefore, they ought to be pulled all out by the roots; for to cut them over, as is ſometimes done, tends rather to increaſe the cauſe of the diſorder by making them ſtronger and ſharper than they were before. This being cautiouſly done with a pair of ſmall forceps or pliers, relief is thus commonly obtained immediately: but unleſs ſome means are adopted to prevent the new hairs which ſhoot out from taking a ſimilar direction, they will very ſpeedily advance ſo far as to induce a return of the diſorder. Nothing, however, can be done to prevent this inconvenience till the new hairs have acquired ſome length; but as ſoon as they are about half their uſual length, and whilſt they are yet more ſoft and pliable than they afterwards become, by turning them down upon the eye-lid with the end of a blunt probe, and retaining them in this ſituation for ſeveral days, or perhaps for two or three weeks, either by covering them with narrow ſlips of adheſive plaſter, or with ſtrong mucilage or glue by means of a ſmall pencil, a complete cure may thus be commonly obtained. Much attention is neceſſary indeed in order to inſure ſucceſs; more, it muſt be acknowledged, than is commonly paid to diſorders of this kind: but due perſeverance in the means we have mentioned will in almoſt every inſtance accompliſh our purpoſe: And as it is an eaſy method of obtaining relief in a very painful diſorder, nothing ſhould be omitted that can tend to render the practice of it frequent and more certain.

When, again, the diſorder appears to originate from any of the other cauſes we enumerated, the particular nature of it muſt be aſcertained with exactneſs before any remedy can be employed. If it is found to proceed from any unequal ſpaſmodic exertion of the orbicularis muſcle of the eye-lid, no danger can enſue from making a ſlight inciſion on the internal ſurface of the under palpebra, of ſuch a depth as to divide thoſe fibres of the muſcle which appear to be preternaturally contracted, and by which the inverſion of the cilia is produced. The only inconvenience that could occur from this, would be ſome degree of ſtiffneſs or immobility in the under eye-lid, which could not be of much importance even in the worſt degree of it that can probably happen: and as no other remedy could in this variety of the diſeaſe be ſuppoſed to prove effectual, no heſitation ſhould occur in adviſing it. If then thoſe fibres of the muſcle which appear to be preternaturally contracted are freely divided, a cure of the diſeaſe will be immediately obtained, and the inciſion will readily heal without being covered with any kind of dreſſing. In this ſituation, indeed, no dreſſing can with propriety be applied to the ſore; but experience ſhows that it is not neceſſary, for a cut in this part commonly heals eaſily.

When the cilia are found to be puſhed in upon the eye, either by a tumour or by a cicatrix of ſome old ſore ſituated in ſuch a manner as to produce this effect, no cure can be expected from any other means than from the removal of the cauſe itſelf. In ſuch circumſtances, therefore, any tumour which occurs ſhould be extirpated in the manner we have already mentioned: And again, when it is neceſſary to remove an old cicatrix, as there is never any neceſſity for going deeper than the ſkin and cellular ſubſtance, it may be taken away with perfect ſafety, merely by making an inciſion with a ſcalpel ſo as to ſurround the whole of it, and afterwards in a ſlow cautious manner to diſſect it off.—When the preſſure produced by the cicatrix upon the cartilage of the eye-lid has been the ſole cauſe of its being turned inwards, the removal of the cicatrix will in general be attended with an immediate cure of the diſeaſe; and in this caſe the ſore may be healed in the uſual manner by ſoft eaſy dreſſings: But when it is found that the direction of the cilia is not immediately altered upon the cicatrix being removed, the lips of the ſore ſhould be drawn together, ſo as to bring the edges of the divided ſkin into immediate contact; and in this ſtate they ſhould be ſecured either by ſlips of adheſive plaſter, or when this is not found to be practicable, the twiſted ſuture with ſhort flat pins may be employed, in order to effect their reunion: By which means the points of the eye-laſhes may be turned altogether outwards, ſo as to accompliſh the intention of the operation in the moſt complete manner.

It has alſo been ſuppoſed, as we have already remarked, that this diſeaſe may be produced by the external ſkin ſituated upon or beneath the eye-lid, being too much relaxed. This, however, is an occurrence which I never met with; and as we cannot ſuppoſe that theſe parts are retained in their ſituation by any exertion of the ſkin alone, it is not probable that any relaxation to which it is liable can have any influence in producing a wrong direction of the cilia; but if the contrary ſhould ever appear to be the caſe, the nature of the remedy that ought to be employed is exceedingly obvious: If the diſeaſe is of ſhort duration, and the relaxation and loſs of tone in the ſkin not conſiderable, bathing the parts frequently with a ſtrong ſolution of alum in an infuſion of oak-bark, the ſtrongeſt aſtringent perhaps which with ſafety can be applied to the human body, ſuch a degree of firmneſs may be reſtored to the affected ſkin, as to accompliſh a removal of the diſeaſe; but when this happens to fail, no doubt ſhould be entertained of adviſing the removal of all the relaxed ſkin with a ſcalpel: and this being done, the divided edges of it ſhould be drawn together, and retained by ſutures in the manner we have directed above where it is neceſſary to remove a portion of the teguments along with any cicatrix that may be found to have produced the diſeaſe.

An inverſion of the eye-laſhes is conſtantly attended, as we have ſaid, with a conſiderable degree of inflammation of the eye-ball: This ſymptom, however, commonly ſubſides on the hairs being removed; but when it does not, thoſe means muſt be employed which we have recommended in a former ſection for the removal of inflammation of the eyes by whatever cauſe it may have been induced.

We have already obſerved, that the diſeaſe we have juſt been treating of, occurs moſt frequently in the under eye-lid. In ſome inſtances, however, it has been met with in the upper palpebra; and in ſuch caſes it is ſcarcely neceſſary to remark, that the diſeaſe being exactly ſimilar both in its cauſes and effects, the means employed for its removal ought alſo to be ſimilar. In the upper eye-lid we ſometimes meet with a ſwelling or tumefaction over the whole of it, by which the uſual and natural exertion of its muſcles is either much impeded or perhaps entirely interrupted, and by which too the eye-laſhes may now and then be ſo far inverted as to produce the diſeaſe in queſtion. In ſuch caſes, as the ſwelling of the eye-lid is commonly of the dropſical kind, it will be more readily removed by two or three ſmall punctures with the point of a lancet than by any other means: But when this does not prove ſufficient, if it appears to be perfectly local, and not connected with an anaſarcous ſwelling over the reſt of the body, rather than allow viſion to be much interrupted by a continuance of the ſwelling, it has been propoſed to cut out a ſegment of the moſt prominent part of the ſkin, to diſcharge any water that may be contained in it, and to re-unite the divided edges of the ſore by ſutures. Nay, much time and ingenuity have been employed in the invention of machines for effecting this operation neatly, and without much loſs of blood; an occurrence, which in former times was always much dreaded. This ſhould indeed be guarded againſt as far as is neceſſary: But in the operation we are now conſidering, it can never require any particular attention, as there are no blood-veſſels in thoſe parts of a ſufficient ſize to render the diviſion of them in any reſpect dangerous.

The machines we allude to were of ſuch a nature as effected the intention of the operator ſolely by preſſure. All the ſkin intended to be removed being included between the flat ſides of two thin braſs plates, a degree of preſſure ſufficient to deſtroy the circulation of the contained parts was now applied, and continued by means of a ſcrew till the whole dropped off. But although this practice has been much recommended both by German and French oculiſts, yet as it originated ſolely from the danger that is apprehended from a diviſion of the blood-veſſels of the eye-lid, but which there is no cauſe to dread, and as the operation may be much more neatly and ſpeedily accompliſhed with the ſcalpel, we have therefore no heſitation in recommending this laſt in preference to every other method that has yet been propoſed. In performing it, as much of the ſkin ſhould be removed as appears to be ſuperfluous: If the edges of the ſore, on being brought together, can be retained by adheſive plaſter, the retention may be attempted by this means; but when the plaſter does not eaſily anſwer, either the interrupted or twiſted ſuture may be employed in the manner we have already pointed out.

SECTION VI.

Of the Gaping, or turning Outwards of the Eye-Lids.

WHEN the internal ſurface of either of the eye-lids is turned outwards ſo as to fold over any part of the cilia, or of the contiguous ſkin, the diſeaſe we are now to conſider is produced: By Noſologiſts this diſorder is in general termed Ectropium; and when the upper eye-lid only is affected, it has been termed Lagophthalmus, from a reſemblance which this affection is ſuppoſed to bear to the eye of a hare.

Any degree of this affection occaſions always much deformity; ſo that even in this reſpect it merits the attention of practitioners: But in more advanced ſtages of the diſeaſe, it is not to be conſidered merely as a deformity or inconvenience; for in this ſituation it is frequently productive of much diſtreſs, not only from the pain induced by a conſiderable portion of the internal membrane of the eye-lid being turned outwards, but by a great part of the eye which naturally ought to be covered being left perfectly bare. It is therefore evident that the removal of affections of this nature muſt always be an object of importance to thoſe who labour under them: And this points out the propriety of more attention being paid to them than practitioners in general think neceſſary.

The internal membrane of the eye-lids may be turned outwards by a variety of cauſes; an enlargement of any part of the ball of the eye, and tumours of whatever nature they may be when ſeated within the orbit, are ſometimes productive of it:

It is ſometimes induced by dropſical effuſions between the external ſkin and this membrane. Violent inflammatory affections of the internal covering of the eye-lids, by the increaſe of bulk which they give to it, frequently turn it outwards. Relaxation, induced either by a preceding inflamed ſtate of this part, by a previous dropſical ſwelling, or merely as a conſequence of old age which is to be conſidered as perhaps the moſt frequent cauſe of it, is in general productive of the moſt obſtinate variety of the diſorder: And laſtly, we find this diſeaſe often induced by the cicatrix of a wound or abſceſs, eſpecially of ſuch as are the conſequences of the confluent ſmall-pox, when ſituated in ſuch a manner as to corrugate or contract the ſkin of either of the eye-lids. In the treatment of the diſorder, it is evident that a due attention is neceſſary to the particular cauſe by which it is produced.

When the diſeaſe is induced by an enlargement of any part of the eye-ball, nothing but a removal of this will have any effect in carrying it off; but as the treatment of this affection of the eye will be the ſubject of one of the enſuing ſections, we muſt for the preſent poſtpone what we have to ſay upon this ſubject; and when tumours of any other nature are diſcovered to be the cauſe of it, they muſt be removed in the manner we have mentioned. When dropſical ſwellings are found to be the cauſe of the gaping of the eye-lids, if theſe are connected with a general anaſarca, the diſeaſe of the conſtitution being carried off by general remedies, this particular ſymptom will moſt frequently yield; but when it appears to be perfectly local, as in ſome inſtances is the caſe, we are not to depend on the uſe of any internal medicine for its removal: In this caſe, the moſt effectual remedy we can employ is an evacuation of the effuſed fluid either by punctures or ſcarifications, not made through the external coverings of the eye-lids, but directly into that part of the internal membrane which is protruded or puſhed out by the water collected within it. Small punctures ſhould be firſt adviſed with the point of a lancet; and if theſe do not prove effectual, ſcarifications may be made either with the ſhoulder of a lancet, or with the knife delineated in Plate XXXI. fig. 3. all along the courſe of the ſwelling; and being carried entirely through the membrane to be divided, they will not only evacuate all the effuſed water, but the inflammation which they excite will have a conſiderable effect in preventing it from collecting again: After the water is completely evacuated, and any inflammation that may have been induced is ſubſided, in order to ſtrengthen the parts which have been relaxed by the ſwelling, they ſhould be frequently waſhed or bathed with ſome gently aſtringent collyrium.

When the diſorder is induced by inflammation, which it frequently is, the treatment muſt be entirely directed to the removal of this ſymptom; and, generally, when the diſeaſe has not been long neglected, or when it does not prove particularly ob-

obſtinate, a cure of the inflammation effects a complete removal of the protruded membrane: But when an inflamed ſtate of this membrane has ſubſiſted for any conſiderable time, the protruſion often continues fixed and permanent long after the inflammation which gave riſe to it is removed: Whenever the diſeaſe therefore is found to depend upon this cauſe, our utmoſt endeavours ſhould be exerted to get it effectually and ſpeedily carried off. We have already, however, in Section II. of this Chapter, entered into a full conſideration of this ſubject: We muſt now refer therefore to what was then ſaid upon it; and ſhall only farther obſerve, that along with what we had formerly occaſion to recommend for the removal of inflammation of theſe parts, deep ſcarifications into the inflamed membrane itſelf ought here to be particularly depended on. The veſſels of this membrane are in this ſtate of the diſeaſe commonly ſo turgid as to give it a conſiderable degree of preternatural thickneſs: Unleſs this increaſe of bulk be removed, no cure can be expected; and nothing with which we are acquainted tends ſo much to accompliſh this as unloading the inflamed veſſels of their contents, which ſcarifications, if properly and freely made, effect in the moſt certain manner.

When, again, the diſorder appears to be the effect merely of relaxation, if this occurs, as it often does, in an advanced ſtage of life as a conſequence of weakneſs induced by old age; it would be highly improper to adviſe any chirurgical operation for its removal. In ſuch circumſtances we ought to depend entirely on a palliative courſe: The patient ſhould be deſired to bathe his eyes daily in cold-water, or in water mixed with a ſmall proportion of brandy; and he ſhould likewiſe uſe an aſtringent collyrium of white vitriol, and of ſaccharum ſaturni diſſolved in water. By theſe means the diſeaſe will be often prevented from advancing farther, and in ſome inſtances may even be completely cured. But whether this ſhould be the caſe or not, when it is evidently induced by old age, as no remedy could probably prevent a return of it, nothing more active or more ſevere in its operation than what we have mentioned ſhould ever be adviſed. The ſame applications too are to be made when the diſeaſe ariſes from relaxation, whether this be the conſequence of inflammation or of dropſical ſwellings.

The laſt cauſe we had occaſion to mention as being productive of this diſorder, is, the cicatrices of ſores, of abſceſſes, and of the confluent ſmall-pox, when ſituated in ſuch a manner as to contract the ſkin of either of the eye-lids; by which a very troubleſome variety of the diſeaſe is often induced. A cicatrix may be ſo ſituated, as we have ſeen in the laſt ſection, as to produce an inverſion of the cilia. Different inſtances of this have been met with; but it more frequently happens, that an affection of a different nature, the diſeaſe we are now conſidering, is induced by it.

In the treatment of this ſpecies of the diſorder, as it is evidently induced by a preternatural contraction of the ſkin connected with the eye-lid, nothing can poſſibly accompliſh a cure but a diviſion of ſuch parts of the ſkin as are thus morbidly drawn together. For this purpoſe, the operator, by an attentive examination of the parts affected, ſhould render himſelf perfectly certain of the full extent of the diſeaſe; and having done ſo, an inciſion ſhould be made directly acroſs that part of the ſkin which appears to be contracted, and ſhould be carried freely into the cellular ſubſtance by which the ſkin is connected to the muſcles and other parts beneath. When the contraction is produced by the ſkin being particularly drawn together at one point only, if a free diviſion of it is effected at this part, the contraction will be immediately removed: But it very commonly happens, that the ſkin, inſtead of being contracted merely at one point, is fixed to the parts beneath over the whole courſe of the cicatrix; in which event, a ſingle inciſion, in the manner we have mentioned, and with which operators in general reſt ſatisfied, will have little or no effect in removing the diſeaſe.

In this caſe, after making an inciſion thro' the teguments from one extremity of the cicatrix to another, the edge of the divided ſkin ſhould be raiſed with a pair of ſmall diſſecting forceps, and the whole of it ſhould be ſeparated by the ſcalpel from the parts to which it is found to adhere. If this is effectually done, that part of the eye-lid which was turned outwards by the contraction, will either return of itſelf to its uſual natural ſituation, or it may be very eaſily replaced by the operator; and this being done, the reſt of the cure muſt conſiſt in ſuch an application of a proper bandage, or of ſlips of adheſive plaſter, as will retain the ſkin in the ſtate in which it ought to remain, till by the formation of new granulations at the bottom of the ſore, any farther contraction may be prevented in future. To give particular directions reſpecting bandages for this purpoſe is very unneceſſary, as it could not probably prove in any degree uſeful. This muſt always be directed by the ingenuity of every operator. In general, however, we may remark, that when ſlips of adheſive plaſter can be made to anſwer the purpoſe of bandages, they ought always to be preferred in every affection about the eyes, where bandages can never be applied of ſuch a degree of tightneſs as is neceſſary for retaining any dreſſings that may be employed, without producing a degree of preſſure upon the parts beneath, which almoſt conſtantly proves hurtful.

SECTION VII.

Of Concretion of the Eye-lids.

WE know that any two parts of an animal body being kept in contact for a certain length of time while in a ſtate of inflammation, will readily unite and adhere very firmly together: A fact which accounts for many phenomena daily obſerved by practitioners; and among others for thoſe adheſions of the eye-lids which now and then ſucceed to an inflamed ſtate of theſe parts. Inflammation of the eye-lids, when of long duration, is frequently found to produce partial adheſions of them, not only to each other, but to different parts of the eye-ball itſelf: This, however, a patient will in general rather ſubmit to, than undergo the pain and terror of an operation for removing it; but when the adheſions are ſo conſiderable as to impede the motion of the eye-lids, and thus to obſtruct viſion, it then becomes neceſſary to employ ſuch means of relief as we know will moſt probably prove effectual. It ſometimes happens, too, that a coheſion is found to take place between the eye-lids at birth: In which caſe, it is likewiſe requiſite to endeavour to remove this obſtruction to viſion, which would otherwiſe ſubſiſt for life.

When the adheſion is ſlight, and has not been of long duration, it may in general be eaſily removed by the end of a blunt probe being inſinuated behind it, ſo as to tear it aſunder by means of it; but when the eye-lids adhere either firmly to each other, or to the eye-ball, a cure can be effected by a ſlow cautious diſſection only. In performing this operation, the patient's head ſhould be firmly ſupported by an aſſiſtant, who ſhould likewiſe endeavour to ſupport or elevate the upper eye-lid, whilſt the ſurgeon, with a pair of ſmall forceps in one hand, muſt endeavour to raiſe or ſeparate the under palpebra, and at the ſame time muſt proceed to divide with a ſcalpel in the other, every fibre that appears to have any effect in forming the adheſion. In every part of the operation much ſteadineſs and accuracy is neceſſary; but this is particularly the caſe when any part of the palpebræ adhere to the eye-ball.

When the cauſe of adheſion is thus completely removed, as dreſſings uſually employed to ſores cannot with propriety be uſed to theſe parts, all that we ought to attempt, is to cover the eye with a piece of ſoft lint ſpread with Goulard's cerate or any other cooling emollient ointment; and after the firſt dreſſing, a ſmall portion of the ſame ointment, perhaps the ſize of a pea or ſo, may be daily inſinuated between the eye-lids: By this means the ſore is kept ſoft and eaſy, at the ſame time that the uſual motion of the eye-lids prevents every riſk of the parts newly divided adhering together again. In this, however, as well as in every operation upon the eye, the ſtructure of which is ſo delicate as to render it very ſuceptible of inflammation, much attention is neceſſary to prevent this ſymptom, and to remove it when it has actually taken place.

SECTION VIII.

Of Fleſhy Excreſcences on the Cornea.

WE frequently find that eyes which have been liable to repeated attacks of inflammation, are apt to have a membranous kind of ſubſtance form in ſome particular point upon the opake cornea, which in ſome inſtances continues of a ſmall ſize, ſo as never to be productive of any inconvenience, but which in others extends ſo as to form a ring round the whole tunica conjunctiva, and which has now and then been known to ſpread to ſuch an extent as to cover not only all the opake cornea, but even the tranſparent part of the eye.

This diſorder begins moſt frequently in the internal canthus of the eye; and on its firſt beginning to ſpread, as it has been ſuppoſed to aſſume the form of a fowl's wing, it has been termed Pterygium; whilſt by others it is named Onyx, from its rememblance to the nail of a finger. But although its commencement is in general obſerved at firſt at the internal angle of the eye, this is by no means univerſally the caſe; for in various inſtances it begins towards the external angle, and in others directly above the middle of the under palpebra on the moſt prominent part of the tunica albuginea.

In ſome inſtances of ſevere inflammatory affections of the eye, we obſerve a tough yellow-coloured membranous kind of ſubſtance to form and ſpread over the whole eye-ball; which, on examination, however, appears to be perfectly inorganic, and is evidently of a nature ſimilar to thoſe cruſts or exſudatious ſo frequently met with in parts recently inflamed: But the diſorder we are now conſidering conſiſts of an organic membranous ſubſtance, which is equally irritable with other parts of the body, and which, when wounded, diſcharges large quantities of blood. It is indeed ſo evidently vaſcular as to render it probable that it conſiſts almoſt entirely of a congeries of ſmall blood-veſſels, which being once forced out from any point of the ball of the eye, either as a conſequence of external violence or of inflammation from any other cauſe, we can eaſily ſuppoſe that every freſh attack of inflammation will cauſe them pullulate or ſhoot out in a degree ſomewhat proportioned to the violence of the cauſe.

In ſome inſtances, this production does not begin to appear till the violence of an ophthalmia is either nearly or perhaps entirely over: In which caſe, it is not attended with much pain, unleſs when ſome irritating body is applied to it; but in others it takes place as a ſymptom of inflammation, when the pain attending it is in general ſevere. During the inflammatory ſtate of the diſorder, this membrane is in general of a deep red colour; but when it occurs without any previous inflammation, which it does in a few inſtances, its colour is commonly a pale yellow. It rarely happens, however, that it cannot be traced as a conſequence of inflammation.

As long as this excreſcence continues of a moderate ſize, and does not impede the motion of the eye-lids, nor obſtruct viſion, all we ought to do is, by means of aſtringent applications, to endeavour to prevent its farther increaſe. In a former ſection, we have ſaid all that appears to be neceſſary on the ſubject of inflammation.

We ſhall now therefore ſuppoſe that the inflammatory ſymptoms are, by the means we have formerly pointed out, either entirely removed or much mitigated, and that our attention is now to be directed ſolely to the removal of this preternatural membranous production. In this ſtate of the diſeaſe, aſtringent applications, as we have ſaid, ought to be alone depended on ſo long as the ſize of the excreſcence does not render it troubleſome. A weak ſolution of corroſive ſublimate in water, viz. one grain of the mercury to four ounces of water, has ſometimes proved uſeful; but in general, nothing anſwers with more certainty than white vitriol or alum, diſſolved in water, care being taken to render the ſolution always of ſuch a ſtrength as the eye can eaſily bear. A ſcruple of white vitriol, or half a dram of alum, to four ounces of water, will in general prove ſufficiently ſtrong; but in every caſe of this nature, the ſtrength of the application muſt be particularly adapted to the feelings of the patient; for with ſome a waſh of this kind may be employed of double the ſtrength that can be admitted by others.

By the eye being bathed three or four times daily with one or other of theſe remedies, or perhaps with a weak ſolution of verdigris, an application now not ſo generally employed as it ought to be, if the diſeaſe has not been long neglected, it will very commonly happen, either that the excreſcence will be conſiderably diminiſhed in bulk, or a leaſt prevented from becoming larger.

A proper uſe of powders, moderately eſcharotic, has frequently, too, proved uſeful in removing affections of this nature; but remedies of this kind require much caution in the application. Calcined alum in fine powder, a ſmall proportion of white vitriol, or of verdigris, mixed with a ſufficient quantity of white powdered ſugar, or any other powder of a mild nature, may all be uſed for this purpoſe. A very ſmall quantity of any of theſe may be ſprinkled over the ſurface of the diſeaſed part once or twice daily, and continued as long as any advantage appears to be derived from them; or the uſe of the powders may be alternated with the application of the waſh in the manner we have mentioned.

A due perſeverance in the uſe of theſe remedies will very commonly, as we have ſaid, prevent affections of this nature from becoming formidable; but when it proves otherwiſe, and when the excreſcence proceeds ſo far as to cover any part of the tranſparent cornea, as this might ſoon be attended with a total loſs of ſight, other means ſhould be employed for removing it.

As our object, in ſuch circumſtances, is to remove the excreſcence entirely, when aſtringent or eſcharotic applications are found to fail in effecting this, the ſcalpel alone is to be depended on. Authors who have wrote upon this ſubject, deſcribe an operation for the purpoſe of removing membranes of this kind by diſſection. When the excreſcence is looſe through a conſiderable part of its extent, and attached to the eye by a ſmall pedicle only, it may be removed with ſafety and expedition by one ſtroke of a ſcalpel; and in ſuch caſes this method ſhould be preferred to every other. But whenever the excreſcence adheres to the eye over its whole ſurface, the removal of it by diſſection is difficult and hazardous; and as the intention of the operation may be accompliſhed by more gentle means, theſe ought to be adopted.

This diſorder begins univerſally, as we have already obſerved, upon ſome part or other of the tunica conjunctiva, and approaches in a gradual manner towards the centre of the eye: We have likewiſe ſeen that the excreſcence which forms this diſeaſe conſiſts almoſt entirely of an extenſion or elongation of a number of ſmall blood-veſſels: Hence we may conclude, that nothing will tend more effectually to remove it than the deſtruction or diviſion of theſe veſſels by which the membrane is produced and ſupported: and accordingly I have in various inſtances been able to accompliſh complete cures of ſuch affections by this means alone. And as the operation for this purpoſe, with thoſe accuſtomed to perform it, is neither difficult nor dangerous, it ought always to be attempted as ſoon as the diſeaſe is found to reſiſt the means uſually employed for its removal.

The method of performing it is this: The patient being placed upon a pillow on the floor, the ſurgeon, ſitting behind him on a chair, ſhould cauſe him incline his head moderately backwards upon his knees, with his face raiſed in ſuch a manner that a ſufficient degree of light may fall directly upon his eyes. This being done, and the patient's hands being properly ſecured to prevent interruption, the under eye-lid ſhould be drawn down as far as poſſible by an aſſiſtant, whilſt the upper eye-lid is ſupported in ſuch a manner by the ſurgeon with his left hand, as to expoſe to view the full extent of the diſeaſe on the eye-ball. The knife, fig. 3. plate XXXI. being now put into his right hand, is to be employed in making ſcarifications thro' the full thickneſs of the excreſcence, near to, and entirely round its external circumference,

ference, ſo as to cut off all communication between the roots and extremities of thoſe veſſels of which it is formed. This may either be done by one continued ſtroke of the ſcalpel, or it may be performed by repeated ſmaller ſcarifications; and in order to render the operation more certain of ſucceeding, by a free diviſion being made of every blood-veſſel connected with the excreſcence, after the diſcharge of blood induced by the firſt inciſions is ſomewhat abated, one, two, or more circular ſcarifications may be made within one another, in ſuch a manner as that the laſt may be contiguous to the centre of the excreſcence.

In making theſe ſcarifications, it is neceſſary to guard as much as poſſible againſt any injury being done to the eye-ball; for which reaſon, it is better to form the inciſions by repeated ſtrokes, than to go to the full depth of the excreſcence at once; but it may be done with much more eaſe in the manner we have mentioned, and with equal ſafety to the eye, than by lifting the ex-

excreſcence with a needle and ligature before dividing it; for we may juſt as readily injure the coats of the eye with the needle as with a ſcalpel: This method of elevating the parts to be divided by means of a ligature, is much recommended by ſome practitioners; but I know from experience, that the operation may be performed with more eaſe in the manner now pointed out.

After as many inciſions have been made as appear to be neceſſary, the parts may be allowed to bleed freely, and may be afterwards bathed twice or thrice daily with a weak ſolution of ſaccharum ſaturni. The inciſions too may be repeated in a ſimilar manner, if, in the courſe of a few days, the excreſcence does not begin to ſhrink and diminiſh in ſize; and the ſame operation may be renewed with perfect ſafety from time to time, as long as any part of the diſeaſe is found to remain.

When, again, any portion of the excreſcence is obſerved to become more looſe in its connection with the eye, either in conſequence of the number of inciſions made in it, or of the ſuppuration which commonly enſues from this operation, it ought by all means to be removed with the ſcalpel; but when this does not take place, and when every part of it continues ſtill to adhere firmly to the eye, no attempt ſhould be made to remove it.

When a cure can be effected by any means hitherto known, the plan we have mentioned will more readily prove ſucceſsful than any other; and as it is not attended with any hazard to the eye, it ought therefore to be very univerſally preferred. But it is neceſſary to remark, that although this operation very commonly proves effectual, yet inſtances now and then occur, in which no advantage is derived from it, and in which any ſcarifications made into the excreſcence, or any other operation performed upon it, inſtead of proving in any reſpect uſeful, are regularly attended with an increaſe of the diſeaſe. When this is the caſe, the operation we have been deſcribing ought not to be perſiſted in. In ſuch circumſtances, a palliative courſe ought alone to be kept in view. No remedy with which we are acquainted will remove the diſorder, but it may commonly be prevented from acquiring any additional increaſe; and the ſymptoms induced by it may be kept moderate, by the eye being frequently bathed with a weak ſaturnine ſolution, and by keeping it covered with pledgits of Goulard's cerate, or any other application of a ſimilar nature.

When it is found, however, that the diſeaſe does not yield to any of the remedies we have mentioned, and if the excreſcence ſtill proceeds to acquire an additional bulk, as ſoon as viſion is deſtroyed by it, and eſpecially when the pain attending it is ſevere, as there will be much reaſon to ſuſpect that it may degenerate into a cancer, it ought at once to be removed by extirpating the eye-ball. The remedy is no doubt ſevere; but in circumſtances ſuch as we are deſcribing, as the uſe of the eye is ſuppoſed to be irrecoverably loſt; and eſpecially as the patient's life might be endangered by the contiguous ſound parts being allowed to run any riſk of being infected by remaining long in contact with thoſe that are diſeaſed; no doubt ſhould be entertained of the propriety of removing them. The method of performing this operation will be the ſubject of one of the following ſections.

SECTION IX.

Of Abſceſſes in the Globe of the Eye.

INFLAMMATION of the eyes is by experience known to terminate moſt frequently by reſolution; that is, the pain and tenſion abate, and the redneſs and fulneſs of the veſſels are diſcuſſed, without any marks being left of their having ever exiſted. Inſtances, however, occur of ſuppuration enſuing from an inflamed ſtate of the eyes; in ſome caſes, from thoſe means, being neglected at firſt which tend moſt certainly to remove inflammation; and in others, from ſome depraved or vitiated ſtate of the conſtitution, which effectually counteracts the operation of every remedy employed for the patient's relief.

When the internal ſurface of the membranes of the eye has been long in a ſtate of inflammation, it is apt to yield a purulent kind of matter, which being poured into one or other of the chambers of the eye, is ſoon diffuſed over all the aqueous humour; by which the ball of the eye is not only much enlarged, but viſion is either in a great meaſure or perhaps entirely deſtroyed; the appearance of the eye is much changed; and neither the iris, pupil, or cryſtalline, can be diſtinguiſhed. This at leaſt is in general the caſe; but in a few inſtances, the iris is puſhed forward, and is obſerved to lie in cloſe contact with the internal ſurface of the tranſparent cornea; and the coats of the eye being weaker here than in other parts of it, a protruſion commonly takes place, which, if not previouſly opened, at laſt burſts of itſelf, and diſcharges either ſome part or perhaps the whole contents of the eye; and at this opening the iris, in a thickened diſeaſed ſtate, is very generally puſhed out. It is this diſeaſe which, from its ſuppoſed reſemblance to a grape, is denominated Staphyloma; different varieties of which are deſcribed by authors under different names: but as theſe are all of a ſimilar nature, and require the ſame method of treatment, any difference of form from whence theſe denominations have been taken, is not of ſuch importance as to deſerve notice; and as the diſtinctions propoſed to be eſtabliſhed ſerve only to confuſe and perplex the younger part of the profeſſion, we do not mean to enumerate them.

Under the general term of Staphyloma, a word we ſhall retain merely from its having been long employed, may be comprehended all collections, ſuch as we have deſcribed, which take place within the cavity of the eye. In moſt inſtances, as we have already obſerved, the tranſparent cornea is protruded from its being the weakeſt part of the eye; but in others, partial ſwellings or protruſions

truſions occur in the ſclerotica, or opake part of the eye.

During the formation of this diſeaſe, the patient ſuffers not only a loſs of ſight, but ſevere pains in the eye, which ſhoot backwards into the head, attended with a conſtant reſtleſſneſs, heat, and other ſymptoms of fever; and theſe very commonly continue, either till the eye burſts of itſelf, or till the contents of it are diſcharged by an opening being made into it.

It happens, at leaſt in moſt inſtances, that patients ſuffer much pain in this diſeaſe; but caſes have now and then occurred, in which no other incovenience has been experienced from it, than deformity and loſs of ſight: but in theſe, any matter formed in the ſwelling is commonly in ſmall quantity, and the principal part of the tumour is found to be of a watery nature, poſſibly from an increaſed ſecretion of the aqueous humour of the eye: But whether the contents of ſuch ſwellings have a greater or ſmaller proportion of pus mixed with them, their external ap-

appearances are nearly ſimilar, and the method of treatment is likewiſe ſimilar.

Beſides the collections we have deſcribed, in which the matter is lodged within the coats of the eye, this organ, we find, is liable to abſceſſes of a different nature, in which the matter is ſeated in the ſubſtance of one or other of its tunics. In the ſmall-pox it frequently happens that a puſtule is ſeated in ſome part of the eye, when the variolous matter being formed between two of its coats, affords all the appearances of a ſmall abſceſs; but collections of pus occur here from external injuries, and from inflammation by whatever cauſe it may be induced, although by no means ſo frequently, as we have already remarked, as they do in other parts of the body.

This diſeaſe has in general been termed Hypopyon. It ought not, however, to be diſtinguiſhed by any particular appellation: for it is preciſely an abſceſs in the coats of the eye, and exhibits exactly the ſame appearances here, and requires to be treated in the ſame manner, as collections of matter in any other part of the body.

It is in this diſeaſe, as in the ſtaphyloma, which we have juſt deſcribed; the matter may be ſituated in various parts of the eye. In ſome inſtances it is met with in the ſclerotica; but it moſt frequently happens, that abſceſſes of this kind are ſeated in the tranſparent cornea, when they very commonly deſtroy viſion entirely. The hypopyon is diſtinguiſhed from the ſtaphyloma by the matter being collected in a particular bag or cyſt; at leaſt it is always confined to one part of the eye, which is obſerved to be elevated into the form of an ordinary abſceſs, whilſt the reſt of the eye retains its uſual form: But in the latter, although the matter does always at laſt force out ſome protuberance at one part or another of the eye; moſt frequently, as we have ſaid, in the tranſparent cornea; yet an enlargement may be always obſerved over the whole ſubſtance of this organ. In both, the motion of the eye-lids is much impeded: but in the ſtaphyloma, this is always more conſiderable and more diſtreſſing than in the other, a ſenſe of tightneſs being felt over the whole globe of the eye; whereas in the hypopyon, this uneaſineſs occurs at a particular point only. In the latter, too, the pain is ſeldom ſo ſevere as when the matter is collected within the ball of the eye. Any uneaſineſs produced by it, affects the ſurface of the eye only, and does not ſpread back towards the head as it commonly does in the ſtaphyloma.

In the treatment of the ſtaphyloma, as it rarely happens that the uſe of the eye can be preſerved, our great object in general is, to endeavour to abate the violence of the pain, which is often very ſevere, and to remove that deformity which an enlargement of the eye is always ſure to produce. With a view to abate the pain, blood-letting, bliſters, cooling applications to the eye, and opiates, are to be chiefly depended on in the commencement of the diſorder. In this ſtage of the diſeaſe, indeed, it is to be conſidered entirely as an inflammatory affection, and to be accordingly treated in the manner we have pointed out in Sect. ii. of this Chapter.

But if theſe and the other means employed for abating inflammation, do not prove effectual; if ſuppuration takes place; and if the pain ſtill continues ſevere, as this very commonly occurs from the coats of the eye being over-diſtended; nothing will ſo certainly afford relief, as evacuating the matter by making an inciſion into the ball of the eye. This will commonly indeed produce a diſcharge of all the humours of the eye, particularly of the aqueous humour; but in circumſtances ſuch as we are deſcribing, this is not to be regarded, as viſion is totally deſtroyed in conſequence of the diſeaſe. We are therefore to uſe the moſt effectual means for removing pain, and for obviating the deformity induced by the tumefaction of the eye, without any regard to the humours contained in it. For this purpoſe, an inciſion ſhould be made into the eye ſufficiently large

PLATE. XXXI.

FIG. 1.

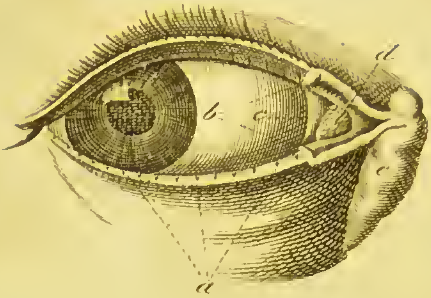


FIG. 2.

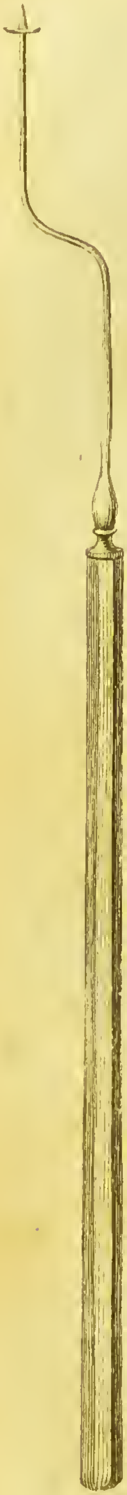


FIG. 3.

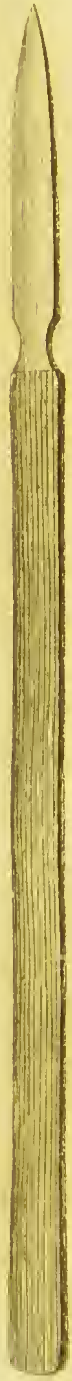
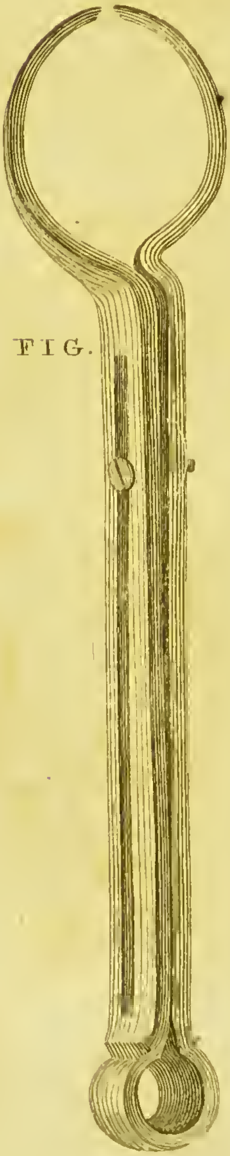


FIG. 4.



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for diſcharging all the thinner part of its contents. The proper place for this inciſion is the moſt depending part of the tranſparent cornea, or perhaps the moſt prominent part of the ſmall tumour, which commonly occurs in this diſeaſe in ſome part or other of the eye, from a protruſion of ſome of its coats induced by the collected matter within. The patient's head being ſecured by an aſſiſtant, and the operator ſtanding before him, the eye-lids may be ſufficiently ſeparated by the fingers of one hand, while the point of the knife, fig. 3. Plate XXXI. being introduced with the other into the part to be opened, it may be eaſily carried forward in a horizontal direction, till an opening is effected of a ſize ſufficient for our intended purpoſe.

Authors who have wrote upon this ſubject, inſtead of a ſimple inciſion into the ſwelling, direct all the prominent part of the eye to be cut off either with a ſcalpel or a pair of ſciſſars: Whilſt others, from an apprehenſion of hemorrhagies being produced by ſuch an extenſive wound as this would occaſion, have adviſed the tumour to be removed by ligature; by which they imagine that the eye may be ſufficiently diminiſhed, at the ſame time that the deformity produced by the ſwelling will be effectually removed. There is no neceſſity, however, for our adopting either of theſe methods; which are both of them more painful, and neither of them in any reſpect more uſeful, than the mode we have adviſed, of evacuating the contents of ſuch tumours by a ſimple inciſion. The diſeaſe, as we have already obſerved, is in reality an abſceſs, or a collection of matter within the coats of the eye; and it ought to be treated exactly in a ſimilar manner with abſceſſes in other parts of the body; not by removing any part of the tumour, but merely by laying it open in the manner we have mentioned. There is indeed a variety of the ſtaphyloma ſometimes met with, in which, either from a long continuance of the diſeaſe, or from ſome cauſe with which we are not acquainted, the different humours of the eye are totally abſorbed, or as it were annihilated, and where all the external appearances of the diſeaſe which we have deſcribed are very diſtinctly obſerved; but the tumour which takes place is formed by a thickening of the different coats of the eye, and particularly of the iris. In ſuch occurrences, the operation we have mentioned could not prove ſerviceable; and the only means of relief to be depended on, is the removal by a ſcalpel of all the prominent part of the eye. It rarely happens, however, except in the very advanced ſtages of ſtaphyloma, that this variety is met with.

After the contents of the eye have been evacuated, the parts ſhould be ſlightly covered with a ſoft compreſs, moiſtened with a weak ſolution of ſaccharum ſaturni; the patient ſhould be kept upon a low cooling diet; and every part of an antiphlogiſtic regimen ſhould be followed, either till the wound in the eye is completely cured, or till there appears to be no riſk of an acceſſion of inflammation.

With reſpect to the treatment of the

hypopyon, namely, that ſpecies of the diſeaſe in which matter is collected, either in the ſubſtance of one of the coats, or between two of the coats of the eye, it ought to be nearly ſimilar to what we have adviſed for the ſtaphyloma. In general, the pain in this diſorder is not very ſevere; ſo that it may always be kept moderate by ſmall doſes of opiates; and as ſoon as the matter is freely and clearly formed, it ought to be evacuated by an inciſion made in the manner we have mentioned, in the moſt depending part of the abſceſs.

The general practice on this point, ought by no means to be imitated. We commonly obſerve, that practitioners decline to operate in affections of this nature, till they are in ſome meaſure forced to it, either by the deformity being conſiderable, or by the abſceſs becoming ſo large as greatly to impede the motion of the eye-lids.—But delays ſhould be always avoided when it is once evident that ſuppuration has taken place; for as the matter of an abſceſs of this kind will juſt as readily burſt inwardly, ſo as to mix with the humours of the eye, as outwardly by an external opening; and as this very conſtantly terminates in a total annihilation of any degree of viſion which may hitherto have remained; it ought to be as much as poſſible guarded againſt, by the matter being evacuated in the manner we have directed, as ſoon as it is certain that ſuppuration has taken place.—The after-treatment of the parts ought to be the ſame here as what we have directed for the ſtaphyloma.

SECTION X.

Of dropſical Swellings of the Eye-ball.

IN the preceding ſection, we have ſeen that the globe of the eye is ſometimes enlarged by pus being effuſed within its cavity; and in a few inſtances that an enlargement of it is produced by a ſmall quantity of pus being mixed with an increaſed ſecretion of the aqueous humour. In caſes of this nature, viſion is commonly deſtroyed by opacity produced in the aqueous humour in conſequence of a mixture of purulent matter. The eye, however, is liable to be enlarged by a different cauſe, which does not communicate any opacity to it, namely, by a preternatural quantity of the aqueous humour collecting in it without any mixture of pus or of any other matter.—In this affection, the patient at firſt complains of a ſenſe of fulneſs in the eye, which continues to occaſion a good deal of diſtreſs long before any increaſe is obſervable in the ſize of the eye; at laſt the motion of the eye-lids begins to be impeded; and although the power of viſion ſtill remains in ſome degree, yet it gradually becomes more imperfect, till in the latter ſtages of the diſorder the patient can only diſtinguiſh light from darkneſs: and in this period of the diſeaſe, too, ſome part of the eye, moſt frequently the tranſparent cornea, generally begins to protrude ſo as to form a ſmall tumour, ſuch as we have deſcribed in the ſtaphyloma. If the contents of the eye are not now diſcharged by an operation, the ſwelling in this ſtate commonly proceeds to increaſe ſo quickly as to burſt of itſelf; which in general affords immediate relief from any pain which the patient may have ſuffered; but which in this diſeaſe is never very ſevere, excepting in the very laſt ſtages of it, when, from diſtenſion alone, a good deal of diſtreſs is often experienced.

When the diſeaſe has been of long duration, it is very univerſally miſtaken for and confounded with ſtaphyloma; and in the latter ſtages of it, indeed, we muſt acknowledge, that it is with much difficulty they can be diſtinguiſhed. In this period of the diſeaſe, its external appearances are exactly ſimilar to the ſtaphyloma: but in the pure dropſical ſwelling, the patient is always ſenſible to the effects of light; and if the pupil can be diſtinguiſhed, a clear light will commonly be obſerved to produce ſome contraction in it. Now in the other, excepting in its very firſt ſtages, the patient is never ſenſible to light, nor can any kind of contraction be diſcovered in the pupil. When the two diſeaſes, however, are far advanced, it is ſeldom of much importance whether we have it in our power to diſtinguiſh them or not, as the uſe of the eye is in general ſo much deſtroyed as not to be recoverable: but in the commencement of this affection, we may very commonly with ſome certainty diſtinguiſh it from the other; and when we are able to do ſo, it ought always to be attended to.

From the account we have given of the ſtaphyloma, it appears evidently to be the conſequence of inflammation. It begins with all the ſymptoms of it, and terminates, as we have ſaid, in the formation of matter. By this circumſtance alone it is very diſtinctly marked; and by attending to it, we can ſeldom, in the early period of the diſeaſe, have much difficulty in diſtinguiſhing it from a mere hydropic ſwelling of the eye; in which no ſymptoms of inflammation take place, and in which the only marks of diſeaſe which occur at firſt are a ſenſation of fulneſs in the eye, and which by degrees terminates in an enlargement of the eye-ball, and in a confuſed ſtate of viſion.

When this diſorder is allowed to proceed far before being attended to, as its appearances, as well as the effects produced by it upon the eye, are nearly ſimilar to thoſe which occur from the ſtaphyloma, the treatment we have propoſed for that diſorder will likewiſe be applicable here. The eye-ſight being deſtroyed, all that we have in our power to do, is to remove the pain and deformity produced by the enlargement of the eye-ball; which may be effectually done by an inciſion made in the moſt prominent part of the tumour, in the manner we have mentioned in the preceding ſection. But in the earlier ſtages of this affection, an object of greater importance preſents itſelf, I mean the poſſibility of ſaving the uſe of the eye; which, from the reſult of ſome caſes which I have met with, there is reaſon, I think, to imagine might in many inſtances be done.

When water or any other fluid collects in the eye in ſuch quantities as to diſtend it much beyond its natural ſize, viſion is thus frequently deſtroyed merely by diſtenſion, when no other morbid affection is perceptible. In ſuch circumſtances, when the nature of the diſeaſe is evident, and as ſoon as the eye begins to loſe its uſual powers, inſtead of allowing the ſwelling to increaſe, as is commonly done, till it arrives at a very great bulk, and till the power of viſion is loſt; would it not be better to try the effect of evacuating the fluid by which the ſwelling is produced? No danger could reſult from this, for the operation may be done with perfect ſafety; and it would at leaſt prevent the eye from ſuffering by over-diſtention, and might thus afford leiſure for a cure being effected, either by the application of proper remedies or by ſome change being induced in the part by nature herſelf; an object which ought to be kept more in view, in every hydropic ſwelling, than we find to be commonly the caſe.

The eaſieſt and moſt effectual method of performing this operation, is by making a ſmall opening in the under and moſt depending part of the tranſparent cornea. By inſinuating the point of the knife, fig. 1. plate XXXIII. into this part of the cornea, and making an inciſion of three-tenths of an inch or thereby in length, all the aqueous humour may thus be eaſily evacuated; and as the wound ſeldom heals immediately, the water or ſerum would accordingly be allowed to drain off almoſt as quickly as it is ſecreted. But in the event of the diſeaſe returning after the wound in the cornea is healed, as a repetition of the operation in this part might be productive of a cicatrix of ſuch a ſize as would tend to obſtruct viſion, I ſhould think it more adviſeable to make an opening into the poſterior chamber of the eye, directly behind the iris, either with the point of the knife above mentioned, or, what will be found to anſwer better for this purpoſe, with a very ſmall trocar. This inſtrument, if not thicker than a crow's quill, and being of a flat or lancet-point form, will penetrate the coats of the eye with almoſt as much eaſe as a common couching needle; and an opening made with it will evacuate the aqueous humour of the eye with more certainty, than an opening of an equal ſize made in any other manner.

The patient's head being properly ſupported by an aſſiſtant, the eye-lids may be ſufficiently ſeparated by the operator himſelf with the fingers of one hand, whilſt with the other the trocar is puſhed into the moſt depending part of the eye, by entering the point of it at the diſtance of a tenth part of an inch behind the iris, and carrying it to ſuch a depth as to admit of the extremity of the canula being completely covered by the coats of the eye when the ſtilette ſhould be withdrawn; and as much of the aqueous humour being allowed to run off as is judged proper, the canula may be now taken out, and the opening will require no farther attention. With a view, however, to ſtrengthen the eye, and, if poſſible, to prevent a return

turn of the diſorder, the parts may be frequently bathed in waſhes of a moderately aſtringent nature; viz. in cold water with a certain proportion of brandy, in a ſolution of alum, or in decoctions of oak-bark. In this manner a complete removal of the diſeaſe may in ſome inſtances be obtained; and as it will always afford at leaſt ſome chance of preſerving the eye, we have therefore no heſitation in recommending it in preference to the uſual practice of allowing the eye to become ſo large before it is opened, as to produce in almoſt every caſe an entire loſs of ſight.

When the diſorder has proceeded ſo far as to deſtroy viſion entirely, it has been propoſed to evacuate the contents of the eye, by paſſing a ſmall ſeton or cord thro' it: But in an organ of ſuch delicate mechaniſm, whoſe parts are all extremely irritable, there is reaſon to imagine, that more pain and inflammation would in general enſue from this than from a free inciſion made with a knife or with a lancet; and as all the intention of the operation may be anſwered by this means, it ſhould therefore, I think, be preferred.

SECTION XI.

Of Blood effuſed in the Cavity of the Eye-Ball.

A FREE paſſage of the rays of light to the bottom of the eye, which is abſolutely neceſſary for the purpoſe of viſion, requires a clear and perfectly tranſparent ſtate of the different humours of the eye. We find, accordingly, that viſion is always much impaired, and in many inſtances totally deſtroyed, by any of the humours becoming opake; and as nothing more certainly induces an opacity of the aqueous humour than blood being effuſed in it, whenever this is obſerved to take place, its removal muſt always be an object of importance; for in no other manner can perfect viſion be reſtored.

Blood may be effuſed into one or other

of the chambers of the eye by various cauſes. In ſome inſtances it has happened as a conſequence of putrid diſeaſes, either from a diſſolved ſtate of the blood taking place in theſe, or more probably from a lax ſtate of the ſolids; by which the red globules of the blood are admitted into veſſels and parts which do not naturally receive them, and by which the different ſecretions are in theſe diſeaſes frequently tinged with blood. Blood is ſometimes poured into the eye, too, as the effect of an inflamed ſtate of this organ; but it occurs more frequently from the rupture of a blood-veſſel from external injuries, than from any other cauſe. Blows upon the eye are frequently attended with this effect; and wounds, when they penetrate into the poſterior chamber, are almoſt univerſally productive of it. In ſome inſtances, too, wounds which penetrate into the anterior chamber only are ſucceeded by effuſions of blood; but this is by no means frequent, from the veſſels of this part of the eye being in general ſo extremely ſmall as to be incapable of admitting red blood.

In whatever manner blood may be effuſed into the eye, if it mixes with the aqueous humour ſo as to render it opake, and if it be not ſoon abſorbed, which happens in ſome inſtances, it ought to be diſcharged by an operation. In a few caſes, we obſerve, that a ſmall quantity of blood falling into the eye is not productive of any inconvenience, by its ſinking immediately below the axis of viſion, and remaining in this ſituation without mixing with the aqueous humour. In this caſe, no attempt ſhould be made for removing it: for as long as it continues at the bottom of the eye, no harm can be done by it; and we have it always in our power to remove it, if, at any future period, it ſhould happen to diſſolve in ſuch a manner in the aqueous humour as to render it opake. The method of performing this operation, is exactly ſimilar to what we recommended in the laſt ſection, for the removal of dropſical collections in the eye.

A ſmall opening ſhould be made in the moſt depending part of the tranſparent cornea, by entering the knife at the diſtance of the ſixteenth part of an inch, or thereby, from the junction of the iris to the coats of the eye; and having carried the point of it forward in a horizontal direction to the diſtance of three-tenths of an inch, it ought at this part to be puſhed through the cornea; and by proceeding ſlowly and ſteadily, all that part of this membrane ſhould be divided which lies below the two openings made by the inſtrument at its entrance into and in its paſſage from the cavity of the eye; care being taken to make the inciſion at an equal diſtance from the iris through its whole length.

In this manner an opening will be made, at which the aqueous humour, with any blood that is mixed with it, will be immediately diſcharged: and in order to promote the evacuation of it, the patient ſhould be deſired to turn his face downwards, and the ſides of the divided cornea may be ſomewhat ſeparated from one another by the end of a blunt probe, or with the ſcoop, fig. 4. Plate XXXIII. On the aqueous humour being thus all evacuated, the eye will appear to be much diminiſhed by the anterior part of it collapſing. This, however, is a matter of little importance; for the wound in the cornea commmonly heals ſoon, and the aqueous humour is in general quickly renewed. The only application required after this operation, is a compreſs of ſoft lint moiſtened in a weak ſolution of ſaccharum ſaturni.

SECTION XII.

Of Ulcers on the Globe of the Eye.

IN a former publication we have entered into a full conſideration of the theory and management of ulcers, and ſhall now refer in general to what we have there endeavoured to eſtabliſh upon this ſubject: But ulcers on the eye merit particular attention; for we have here not only the cure of the ſores to keep in view, but means muſt be employed to prevent or remove thoſe marks or ſpots which they almoſt univerſally produce, and which very commonly terminate either in a total or partial loſs of ſight. In other parts of the body, the cicatrix induced by an ulcer is ſeldom productive of any inconvenience; but in the eye, the cicatrix of even the ſmalleſt ſore that occurs in it, is on ſome occaſions attended with very diſagreeable conſequences. It is evident, however, that the effects of ulcers muſt in this reſpect be very different, according to the part of the eye on which they are ſeated. Thus, we obſerve, that ſores of conſiderable magnitude frequently occur upon the ſclerotica without any obſtruction to viſion being induced by them; whilſt ulcers in the tranſparent part of the eye very commonly deſtroy viſion entirely. Our prognoſis therefore, with reſpect to the conſequences of theſe affections, muſt in general depend in a great meaſure on their ſituation; for ſores, which in one part of the eye might not be of much importance, will in others render the organ perfectly uſeleſs.

The danger attending ulcers on the eye, depends in ſome meaſure, too, upon their form, which we find to be equally various here as in other parts of the body; but the ſtructure of the eye renders the form of any ſore that occurs in it of more importance than it can poſſibly be in any other ſituation. In ſome inſtances, ulcers upon the eye are very ſuperficial, being no deeper than the tunica adnata; whilſt in others they are ſmall, narrow, and penetrate to a conſiderable depth. Thoſe which ſpread upon the ſurface of the eye may deſtroy viſion by the cicatrix which they produce; but the deep-ſeated ulcers are not only attended with this effect, but very commonly terminate in an evacuation of the aqueous humour, either from their penetrating immediately through all the coats of the eye, or from their leaving ſuch a weakneſs in ſome particular part of them, as admits of the aqueous, and perhaps of the other humours, forcing a paſſage for themſelves.

In other caſes again, inſtead of a loſs of ſubſtance being produced by ulcers, the parts become ſoft and fungous, and excreſcences or granulations ſhoot out, as we frequently find to be the caſe in ulcers of other parts of the body.

Ulcers of the eye may occur from a variety of cauſes; namely, from wounds, contuſions, burns, &c.: and they may be induced by any general affection of the conſtitution; ſuch as lues venerea, or ſcrophula. But in moſt inſtances they may be traced as the conſequences of inflammation terminating in ſuppuration; for abſceſſes in the eye are often met with; and every abſceſs terminates in an ulcer, excepting in a very few inſtances; in which they either continue during life, or in which the matter, inſtead of being diſcharged by an opening, is abſorbed into the ſyſtem.

Ulcers of the eye are frequently induced by inflammation; and it commonly happens, that inflammation is the moſt troubleſome ſymptom with which they are attended: Indeed the pain which occurs from an inflamed ſtate of an ulcer on the eye, proves in ſome inſtances ſo very diſtreſſing, as to induce reſtleſſneſs, heat, quickneſs of pulſe, and every other ſymptom of a ſmart fever: So that in the treatment of ſores of this nature, this ſymptom of inflammation requires our moſt ſerious attention.

In the management therefore of theſe affections, when they are found to be in an inflamed ſtate, blood-letting, both general and local, ſhould be employed; together with bliſters, laxatives, and cooling applications to the eye, in the manner we have mentioned more particularly in the ſection on Ophthalmia: for till the violence of this ſymptom is much abated, we cannot with propriety employ any remedy directly for the cure of the ulcers. In other caſes of ophthalmia, along with general evacuations, I have urged, in a parcular manner, the propriety of taking blood directly from the part affected, by ſcarifying the turgid blood-veſſels. In ulcers of the eye, too, where we frequently find a conſiderable number of inflamed veſſels paſſing directly from the ſores along the centre of the eye, it often proves uſeful to cut them completely acroſs; not only for the removal of inflammation, but for the cure of the ſores themſelves. Indeed, from obſerving the effects which reſult from this practice, I think it probable, that the diſcharge afforded by ulcers of the eye is commonly ſupplied by theſe turgid veſſels which run into them; for it often happens, that the ſores are cured by this remedy alone, when every other means have failed. The operation, however, requires to be very neatly and ſteadily performed; for when deep and extenſive ſcarifications are made in the neighbourhood of an ulcer, they are apt to degenerate into tedious ſores of a ſimilar nature. This, however, is not the fault of the remedy, but of the method of putting it in practice; for it is an effect I have never obſerved to reſult from it, when the turgid veſſels only have been divided; which may be eaſily done in the manner we have mentioned in one of the preceding ſections.

It has been objected to this practice, that we may render the healing of ulcers more tedious by it than would otherwiſe happen, by dividing the lymphatics which proceed from the ſores along with the turgid blood-veſſels; for theſe, by abſorbing the matter ſecreted or diſcharged into ulcers, have been by ſome imagined to have a conſiderable influence on their cure: and therefore, it is ſaid, that we ought never to run any riſk of dividing them, which muſt always be done in ſcarifying the larger veſſels of the eye, which they very commonly accompany. The idea is ingenious; but ſo far as I have yet ſeen, it is not ſupported by experience. Scarifications, when improperly performed, may in ſome inſtances, as we have ſaid, do miſchief; but in many caſes of ulcers of the eye, I have known them prove very uſeful. Beſides, we might, from reaſoning alone, conclude, that ſcarification, when properly performed, ought not to do harm;

and that the doubts which have been entertained with reſpect to it, cannot be well founded: For although ſome proportion of the matter afforded by ulcers is no doubt carried off by abſorption, yet daily experience ſhows, that we are never to depend upon this for effecting a cure; and, on the contrary, that ſores are more frequently cured by thoſe applications which ſeem to act by deſtroying the power of the abſorbents, as well as of the other veſſels with which the ulcers are ſupplied, than by any other means; namely, by drying aſtringent remedies, and by external preſſure applied with ſuch firmneſs as muſt frequently annihilate the ſmaller veſſels of ſores, by keeping them for a conſiderable time cloſely compreſſed together.

After the inflammatory ſtate of an ulcer on the eye has been removed in the manner we have mentioned, our views ought to be exactly the ſame as in the treatment of ſores in other parts of the body; and the means employed for effecting them, muſt, for the moſt part, be likewiſe ſimilar.

When the diſeaſe is connected with any general affection of the ſyſtem, proper remedies muſt be adviſed for correcting this before any permanent cure can be expected. We find ſores on the eye, in ſome inſtances, combined with lues venerea; when a well-directed mercurial courſe is to be chiefly depended on: But they are much more frequently combined with, and indeed originate from, ſcrophula; a diſeaſe which affects the eye more frequently than any other part of the body; and hitherto we have not been ſo fortunate as to diſcover any certain remedy for its removal. Cold bathing, however, with the uſe of ſteel mineral waters, bark and other tonics, and living in a dry atmoſphere, have frequently proved ſerviceable in this diſorder; and for the ſymptom of which we are now ſpeaking, namely, ulcers on the eyes, iſſues, when duly perſiſted in, are to be more depended on than any remedy with which we are acquainted.

In the local treatment of ſores upon the eye, the remedies to be employed muſt depend entirely on the appearances which take place. Before any attempt is made to induce the formation of a cicatrix, any fungous excreſcences which occur muſt be deſtroyed; and if the matter diſcharged is thin, and the bottom of the ulcer foul, theſe circumſtances muſt be corrected. With this view, detergent ointments and waſhes, as they are called, ſhould be applied; and for the removal of excreſcences, the ſcalpel and cauſtic applications are alone to be depended on.

A general prejudice prevails againſt the uſe of ſtimulating applications to the eye; and in many of the diſeaſes to which this organ is liable, they certainly cannot be employed with propriety; but in others, eſpecially in ulcers, they may not only be applied with perfect ſafety, but with much advantage: in many inſtances a cure cannot be otherwiſe accompliſhed, and a great deal of miſchief is daily done by the contrary practice of a long-continued uſe of emollients. In caſes of ophthalmia, accompanied with much pain and tenſion, a proper uſe of emollients, particularly of warm fomentations and cataplaſms, will in ſome inſtances prove extremely uſeful; but in ulcers of the eye, after any inflammation with which they may have been attended is removed, inſtead of being productive of any advantage, I have conſtantly obſerved that they do harm. They not only ſeem to promote that tendency to relaxation and ſpongineſs which uſually occurs in theſe ſores, but in different inſtances they have appeared to be the ſole cauſe of thoſe excreſcences very frequently met with in ulcers of the eye, and which always prove extremely troubleſome. When I firſt engaged in practice, I entered into a free uſe of remedies of this claſs, in ulcers as well as in other affections of the eyes; but from repeated inſtances of their proving hurtful, I am now convinced that they ought to be employed with much caution.

In ulcers that are hollow, with foul edges, and that diſcharge thin and perhaps fetid matter, a liniment of wax and oil,

with

with a ſmall proportion of red precipitate, commonly anſwers the purpoſe of cleanſing them; or the ſame intention may be obtained from a remedy of the ſame nature, prepared with white vitriol, or with a ſmall proportion of verdigris; care being taken to have the liniment of ſuch a thin conſiſtence, that by means of a ſmall bruſh or pencil a little of it may be eaſily applied at any time over the whole ſurface of the ſores. By adding a ſmall proportion, too, of camphor to applications of this nature, their effects in cleanſing ulcers of the eye are frequently improved; and the ſame remedy proves ſometimes ſerviceable in a diſſolved ſtate, when employed as a waſh to theſe ſores. The moſt effectual waſh, however, for this purpoſe, is either a weak ſolution of verdigris in water, or of white vitriol; and I have on ſome occaſions employed, with much advantage, a weak ſolution of corroſive ſublimate in water. One grain of corroſive mercury in four ounces of water, makes a ſolution of a ſufficient ſtrength for this purpoſe.

When by a due continuation of theſe means, or of remedies of a ſimilar nature, an ulcer on the eye is properly cleanſed, and a good ſuppuration induced, by the aſſiſtance of a magnifier granulations will be obſerved to form; any deficiency of parts which may have been induced by the ſore will ſoon be filled up; and, if no interruption occurs to the cure, a cicatrix will ſoon be obtained.

It often happens, however, in this ſtate of the diſorder, that a cure is with difficulty accompliſhed. The ſurface of the ſore remains ſoft, and becomes ſomewhat elevated above the reſt of the eye, by which a cicatrix is prevented from forming upon it: In this ſituation, drying aſtringent applications prove moſt effectual. The parts affected ſhould be covered once or twice daily with lapis calaminaris finely levigated; with prepared chalk, or with crab's eyes; and they may be bathed morning and evening with a ſtrong ſolution of alum, with brandy properly diluted, or with a ſtrong infuſion of galls or of oak-bark: by theſe means, when the conſtitution is otherwiſe healthy, a cure will in general be obtained.

When, again, a ſore upon the eye, inſtead of being hollow and attended with a deſtruction of ſome of the parts in which it is ſeated, is found to be covered with a fungous production, this excreſcence muſt be removed before any permanent cure can be expected; and the ſame means muſt be employed for this purpoſe here, that are found to prove moſt effectual for the removal of excreſcences in other parts of the body.

In ſome inſtances, productions of this nature arrive at a conſiderable magnitude, and, after ſeparating the eye-lids, fall down upon the upper part of the cheek. Of this, there are different caſes recorded by authors; ſome of which were on diſſection found indeed to be connected with the more interior parts of the eye, when extirpation of the eye itſelf would no doubt be rendered neceſſary; but it ſometimes happens, that tumours of this kind are found to adhere to the ſurface of the cornea only, when they may commonly be removed without any material injury being done to the eye. We are, in general, directed in caſes of this nature, to attempt the removal of theſe excreſcences by ligature; but as this frequently proves painful, tedious, and uncertain, the ſcalpel or lunar cauſtic ought for the moſt part to be preferred.

For the removal of a large excreſcence, exciſion by the ſcalpel ſhould alone be truſted to; and when done with caution, no danger can occur from it. The patient being firmly ſeated oppoſite to a clear light, and the ſurgeon ſitting before him, his head ſhould be ſupported by an aſſiſtant behind, who at the ſame time ſhould ſeparate the eye-lids, by elevating the one and drawing down the other; which may be eaſily done by the fingers of each hand properly placed upon them. This being accompliſhed, a needle armed with a firm waxed ligature ſhould be paſſed through the centre of the excreſcence, for the purpoſe of fixing it and raiſing it as much as poſſible from the ſurface of the eye; and with one hand the operator ſhould lay hold of this ligature, while with a ſcalpel in the other he ſlowly and ſteadily diſſects off the excreſcence. The only dreſſing that can be applied here, is a piece of ſoft lint ſoaked in a ſolution of ſaccharum ſaturni, or in any cooling liquid, laid over the eye-lid; and if the ſore produced by the operation does not heal eaſily, ſome of theſe aſtringent applications muſt be employed that we have juſt had occaſion to mention.

But in the treatment of excreſcences of the eye which are not pendulous or much elevated, there is no neceſſity for the uſe of the ſcalpel, as they may almoſt always be removed with much certainty by a proper application of cauſtic. By touching the ſurface of the part intended to be deſtroyed with a piece of lunar cauſtic, either daily or once in the two days, any protuberance which occurs will ſoon be removed; and the ſore being in this manner reduced to the level of the reſt of the eye, a cure may be obtained by the means we have already mentioned.

It is neceſſary, however, to remark, that in the application of cauſtic to the eye, much ſteadineſs and nicety is neceſſary; but with due attention it may be done with perfect ſafety, and often with much advantage. In order to prevent the reſt of the eye or the eye-lids from ſuffering by coming into contact with the cauſtic, the eye ſhould be previouſly fixed with a ſpeculum, and after the excreſcence is rubbed over with cauſtic, before removing the ſpeculum, it ſhould be entirely waſhed off with a ſmall bruſh or pencil ſoaked in warm water, or in warm milk, which proves commonly more effectual than any other liquid for deſtroying the activity of cauſtic applications. In this manner, all the advantages may be obtained from the uſe of lunar cauſtic, which we daily experience from it in the removal of excreſcences in other parts of the body; and when applied with caution, it may be done without any kind of riſk.

We have already remarked, that when the conſtitution is ſound, ulcers of the eye will commoly heal by the means we have mentioned; but it happens in ſome inſtances, that they ſtill continue obſtinate, and even daily become more virulent, notwithſtanding the uſe of theſe, and all the other remedies that may be employed: In which event, whenever the diſeaſe has advanced ſo far as to deſtroy viſion, and when it is ſtill proceeding to increaſe, as nothing but extirpation of the morbid parts will afford any chance of preventing it from ſpreading to the contiguous ſound parts, this ought certainly to be adviſed. The method of extirpating a diſeaſed eye will be the ſubject of a different ſection.

SECTION XIII.

Of Specks or Films upon the Eye.

WE frequently obſerve that viſion is obſtructed by opake ſpots or films forming upon the eye: A diſeaſe commonly termed Leucoma, Albugo, or Nubecula.

Spots of this kind are met with upon the ſclerotica or white part of the eye; but in this ſituation, as the inconvenience which enſues from them is ſeldom of much importance, they do not often become the object of Surgery. In the tranſparent part of the eye, however, they always require our moſt ſerious atention; for in this ſituation, even the leaſt degree of opacity will be frequently productive of an entire loſs of viſion: and although we cannot in every inſtance accompliſh a total removal of them, yet we can often do ſo, and, by proper management, we have it frequently in our power to preſerve eyes which otherwiſe would in all probability be loſt.

We have already entered into the conſideration of various affections which may tend to obſtruct viſion, by inducing an opake ſtate of the tranſparent cornea and humours of the eye. Thus every high degree of inflammation; the ſtaphyloma, hypopyon, and ulcers on the tranſparent part of the eye; are all attended with this effect: but as each of theſe forms a diſtinct diſeaſe, requiring a method of treatment peculiar to itſelf, we have judged it proper to allot a ſeparate ſection for each of them. What we now mean to conſider, are thoſe white opake ſpots frequently met with on the cornea, and which occur moſt commonly as the conſequence of inflammation.

Affections of this kind are for the moſt part, indeed, ſo evidently induced by inflammation, that we doubt if they ever occur from any other cauſe; for all thoſe ſpecks which ſucceed to accidental wounds of the cornea, or to ſuch operations as are performed upon it, as likewiſe thoſe which occur in the ſmall-pox and meaſles, are always preceded by an inflamed ſtate of the eye: We therefore conclude, that they depend, perhaps entirely, on inflammation, by whatever cauſe this may at firſt be excited.

When we attend to the nature of theſe opake ſpots upon the eye, it appears ſufficiently obvious, that they are produced in moſt inſtances by that effuſion, with which inflammation, when in a high degree, is always attended. In ſome caſes, when it terminates in complete ſuppuration, a ſmall abſceſs is produced; which either on burſting, or on being opened in the manner we have directed in a preceding ſection, very commonly leaves an opake ſpot, attended with ſome degree of prominency or elevation of the parts in which it is ſeated: But in others, when the effuſion, inſtead of being near to the ſurface of the cornea, is perhaps diffuſed among the different lamellæ of which this part of the eye is compoſed; or when the degree of inflammation which takes place is not ſufficient for carrying it on to ſuppuration, the opacity induced by it does not, as in the caſe of an abſceſs, form a ſmall protuberance; but appears rather to conſtitute a part of the ſubſtance of the cornea itſelf. In the one, the different lamellæ of the cornea are much ſeparated from one another; and on the matter contained between them being evacuated, the ſpeck which remains appears in the form of an adventitious body, adhering to, but not intimately connected with, that part of the eye on which it is ſeated: Whereas in the other, that is, when a ſmall effuſion only has taken place, and when no tendency to ſuppuration occurs, although a very conſiderable degree of opacity may be produced by it, yet the niceſt examination will not diſcover the cornea to be at this part either elevated or increaſed in thickneſs. In this caſe, the diſeaſe appears to form a part of the eye itſelf, and cannot be ſeparated from it but with the deſtruction of the organ; whereas in the other, the appearances which it exhibits are ſuch as would lead one to conſider it entirely as a preternatural formation; and in many inſtances it may be removed without much injury being done to the eye.

Theſe ſpots upon the eye are met with in various forms and in different degrees of magnitude; but the diſtreſs induced by them is always in proportion to their extent, to their degree of opacity, or to their ſituation with reſpect to the pupil; for as they prove hurtful merely by preventing the rays of light from paſſing to the bottom of the eye, it is evident that it is by one or other of theſe circumſtances that this muſt be determined. When a ſpot upon the eye, therefore, is either ſo extremely ſmall, ſo ſlightly opake, or ſo far removed from the pupil, that viſion is not much hurt by it, we ought not to conſider it as an object of Surgery; for till the uſe of the eye is impaired by it, as it is never attended with pain unleſs when the parts are inflamed, no other conſideration can render it proper to meddle with it: for every practitioner knows that this organ is ſo very delicate, as often to ſuffer more by the means employed for removing diſeaſes, than it previouſly did by the diſeaſes themſelves. But whenever viſion is materially impaired, we are then authoriſed to endeavour to remove the cauſe by thoſe means which experience has ſhown to prove moſt proper for this purpoſe.

We have ſhown that inflammation is to be conſidered as the principal, and perhaps as the only cauſe of this diſorder: Beſides other motives, therefore, this ought, in every caſe of inflamed eyes, to convince practitioners, of the propriety of loſing no time in the application of proper remedies; for whenever the diſeaſe has proceeded ſo far, as to induce any degree of effuſion, we can have no certainty of being able to prevent either a partial, or perhaps a total loſs of ſight. The means beſt adapted for the removal of inflammation having been already pointed out, we do not now think it neceſſary to repeat them; and ſhall proceed to mention thoſe remedies which are to be chiefly depended on in the treatment of ſpecks already formed.

In the management of ſpecks upon the eye, it is a matter of much importance to attend to the particular nature of each of them; for the two varieties we have mentioned of this diſorder, are ſo very oppoſite to each other, that ſuch remedies as are found to prove very uſeful in the one, are ſcarcely, if at all, admiſſible in the other: and hence it happens, that the ſame applications being indiſcriminately employed in every caſe, a great deal of injury is done which ought not to have happened; and remedies fall into diſcredit which, when properly applied, prove commonly of much advantage.

Thus it is found by experience, that eſcharotic applications of a moderate ſtrength may with ſafety be applied to the eye; and as ſpecks upon the cornea are in many inſtances removed by them, it has long been the common practice to apply them with equal freedom in every caſe. By attentive obſervation, however, to this branch of practice, I am perfectly convinced,

ced, that it is in one variety of the diſeaſe only that remedies of this claſs ever prove uſeful; namely, in that which is attended with an evident prominency or elevation of the diſeaſed part. In ſuch inſtances, when the cornea beneath happens to be ſound, the removal of this elevated opake ſpot will leave it perfectly tranſparent, and fit for the purpoſes of viſion: and in ſuch caſes, eſcharotics of a mild nature may with much propriety be employed: But in the other ſpecies of the diſeaſe, where the effuſed matter ſeems to ſpread through the whole ſubſtance of that part of the cornea in which it is ſeated, without raiſing or elevating any part of it, no advantage can be expected either from eſcharotics, or from any other kind of external application. In this caſe, the diſeaſed part of the cornea, as we have formerly mentioned, does not ſeem to be thicker than the other parts of it; and it is impoſſible to deſtroy the effuſed matter without deſtroying the cornea itſelf. In ſuch circumſtances, the employment of eſcharotics can never be proper; and we have no heſitation in ſaying, that in this ſtate of the diſeaſe, they can never be uſed but with a much greater chance of doing harm than good.

It ſometimes happens, however, even in this variety of the diſeaſe, that the patient either recovers a partial or perhaps a complete uſe of his eye, by the opacity in the cornea being gradually carried off, probably by an abſorption taking place of the effuſed matter. As this has in ſome inſtances been effected by a natural exertion of the ſyſtem, practitioners ought, in the treatment of the diſeaſe, to endeavour to aſſiſt this operation of nature, by employing ſuch remedies as are known to prove moſt effectual in promoting abſorption: and with this view, there is nothing perhaps to be ſo much depended on as a gentle but long-continued courſe of mercury. In ſimilar affections of other parts of the body, mercury often proves uſeful; and it is the only internal medicine which, ſo far as I have yet ſeen, ought to be depended on in this diſeaſe. Iſſues have in ſome inſtances, too, appeared to be uſeful; and as a cord in the neck in general diſcharges plentifully, it commonly anſwers the purpoſe moſt effectually.

With the ſame view, too, a briſk purgative being given from time to time during the mercurial courſe, may ſometimes prove ſerviceable; but it muſt be acknowledged, that the effect of our practice in this diſeaſe is extremely uncertain: for although, in a few caſes, ſome advantage has apparently been derived from the remedies we have mentioned, yet this has not happened ſo frequently as to admit of our placing much dependence upon them.

With reſpect to external applications; for the reaſons we have already given there can never be any room for much expectation from them; they may do harm, but they can never accompliſh a removal of the diſeaſe. When indeed the eye is inflamed, and eſpecially when the opake ſpot appears to have turgid veſſels running into it, the uſe of a ſaturnine ſolution, or any other aſtringent waſh, may be very proper; and in ſuch caſes, it may likewiſe be proper to employ general blood-letting, at the ſame time that we empty the veſſels of the eye by dividing thoſe that are turgid. But for a more particular account of the remedies to be employed in ophthalmia, we muſt refer to the ſection upon that ſubject.

Although in this variety of the diſeaſe our efforts are ſeldom of much evident utility, in the other a due attention to the different circumſtances of the caſe proves often highly ſerviceable. As in this caſe we ſuppoſe the diſeaſe to conſiſt in a thin lamella of the cornea being elevated from the reſt of this covering beneath, by an effuſion of ſome kind of matter, and as this ſeparated portion is in general perfectly opake, the only chance we have of effecting a cure is to remove it entirely. Even this will not always leave the eye perfectly clear and tranſparent; for it ſometimes happens, either from the effuſed matter having been of a ſharp corroſive nature, or from its having been long confined, that a roughneſs, attended with ſome degree of opacity, is left upon the remaining part of the cornea. This, however, is not univerſally the caſe; and, at any rate, although a complete cure may not in every caſe be obtained by the removal of the elevated part of the cornea, yet in almoſt every inſtance ſome advantage will be derived from it, by a greater quantity of light being thus allowed to paſs to the retina.

With reſpect to the method of removing ſpots of this kind, they may be taken away either by the knife or with eſcharotics, but in general the former is preferable. The eye being properly fixed with a ſpeculum, plate XXX. fig. 1. the ſurgeon ſhould ſeat himſelf in a convenient height between the patient and the clear light of a window; when, with repeated ſmall ſtrokes of the knife, plate XXXI. fig. 3. he ſhould endeavour to cut away and remove all that portion of the cornea which is in any degree ſeparated from the reſt; for no part of it that is ſeparated will ever adhere again, and the cure will not be complete if any portion of it is allowed to remain.

As the eye is extremely tender and delicate, the operation we have mentioned appears to be very formidable to thoſe who have not been accuſtomed to perform it; but it may be done with ſafety by any perſon poſſeſſed of ſufficient caution and ſteadineſs. The ſpeculum we have mentioned fixes the eye completely; and on the head being properly ſecured by an aſſiſtant, any operation of this nature may be done with perfect ſafety. The knife I have mentioned will in moſt caſes be found to anſwer; but in a few inſtances a knife with two edges I have thought has anſwered better. A repreſentation of ſuch a one may be ſeen in Plate XXXIII. fig. 1.

Patients, however, will not always ſubmit to this operation: In which caſe we are under the neceſſity of employing eſcharotics; and by theſe being continued for a ſufficient length of time, we have it often in our power to remove blemiſhes of great firmneſs and of conſiderable extent: and although very ſtrong applications of this kind are not admiſſible, and have frequently done miſchief by creating pain and inflammation, yet we think it right to remark, that there is no neceſſity for ſo much caution on this point as is in general inculcated; for daily experience evinces, that a good deal of freedom may be uſed with remedies of this claſs. It has been alleged, that, beſides raiſing pain and a temporary ſtate of inflammation, eſcharotics muſt prove hurtful by corroding and inducing ulceration on the ſound part of the eye, juſt as readily as they will deſtroy the ſpot intended to be removed. This reaſoning is ſpecious, but it does not appear to be ſupported by experience; for every practitioner muſt have obſerved, and it is well known to itinerants, who commonly uſe little delicacy in matters of this kind, that ſpecks upon the cornea are frequently removed by the effects of eſcharotics alone, without any kind of harm being done to the reſt of the eye; and the fact, I think, may be accounted for. So far as I have been able to obſerve, thoſe ſpecks in which eſcharotics are employed with moſt advantage, conſiſt of a ſubſtance in which there is little or perhaps no animal life; at leaſt they are perfectly white, are deſtitute of the circulation of red blood, and are ſo far inſenſible that little or no pain is experienced from their being cut or even bruiſed with much freedom. Now we know, that in other inſtances, eſcharotic or corroſive applications of a moderate ſtrength will deſtroy a part of a dead animal, which during the life of the animal would have produced no effect upon it. This is particularly remarkable in a proceſs which ſometimes occurs in the ſtomach after death; a curious fact, firſt taken notice of by that very ingenious practitioner Mr John Hunter of London. The ſtomach has frequently been found on diſſection to have holes corroded in it, even where no pain or other ſymptom of diſeaſe of this organ had previouſly exiſted; from whence we may fairly conclude, that the liquor gaſtricus, or that fluid which nature has provided for the purpoſes of digeſtion, although during the life of the animal it may act only as a moderate ſtimulus to the viſcera, yet after death, the ſtomach being now deprived of the power of reſiſting the corroſive property of this liquor comes at laſt to be deſtroyed by it. In the ſame manner we may ſuppoſe, that a dead lifeleſs ſpot may be removed by corroſive applications, the ſtrength of which is not ſufficient to affect the reſt of the eye.

We may thus account for the cauſe of this phenomenon; but whether our reaſoning ſhall appear to be well founded or not, the fact, as we have ſaid, is certain, that corroſive applications may be made to the eye ſufficiently ſtrong for removing many of thoſe ſpots to which it is liable, without any injury being done to the reſt of the organ.

For a conſiderable time I was afraid to apply remedies of an eſcharotic nature with any kind of freedom to the eye; farther experience, however, has convinced me, that they may be uſed with more ſafety than is commonly imagined.

Remedies of this kind may be uſed in different forms; but they are moſt conveniently employed in the form of a powder, an ointment, or a waſh. When powders are uſed, they ought to be very finely levigated; otherwiſe, by their ſpiculæ, they are very apt to irritate and inflame the eye: and, for the ſame reaſon, when they are joined to ointments, they ought likewiſe to be very finely prepared. Such articles of this kind as are ſoluble in water, are perhaps preferable to any; for in the form of ſolution they can never prove hurtful if their ſtrength be duly attended to, as in this manner no ſharp particles can poſſibly be applied to the eye.

In the form of a powder various articles have been employed; but the moſt effectual perhaps of any of them, is red precipitate or verdigris finely levigated, and mixed with three or four parts of fine ſugar. Calcined alum, too, and white vitriol, likewiſe mixed with a proportion of ſugar, or with egg-ſhells in fine powder, have frequently proved uſeful.

Ointments for the ſame purpoſe are prepared by adding to fine hogs-lard, or any emollient ointment of the ſame conſiſtence, ſuch a proportion of any of the powders we have mentioned as the patient is able to bear; and waſhes are made by diſſolving a due proportion of the ſubſtance to be employed, in water. For this purpoſe, verdigris or white vitriol are found to prove very ſerviceable; and on ſome occaſions I have known good effects to reſult from a weak ſolution of corroſive ſublimate.

It is impoſſible, in caſes of ſpots upon the eye, to confine any application to the diſeaſed part; all we can do is to inſert the powder, ointment, or waſh, as much as poſſible within the eye-lid; by the motion of which it is very quickly conveyed over the whole ſurface of the eye. In order to have every poſſible advantage from remedies of this claſs, their uſe ſhould be long perſiſted in, and two or even more of them ſhould be employed at the ſame time. Thus, a ſmall quantity of any of the powders or ointments we have mentioned, may be inſerted within the eye evening and morning, and a weak ſolution of corroſive ſublimate, of verdigris, or of white vitriol, may be employed twice or thrice daily for waſhing the eye.

It cannot be alleged, that theſe or any other remedies will in every inſtance prove effectual; but I can with confidence ſay, that a prudent and long-continued uſe of them will frequently remove ſpots upon the eyes, which otherwiſe would probably terminate in an entire loſs of viſion.

SECTION XIV.

Of Protruſions of the Globe of the Eye from the Socket.

EVERY practitioner muſt have met with inſtances of the eye being puſhed more or leſs from its natural ſituation in the ſocket, and various caſes are recorded of it by authors.

The

The eye may be protruded from its ſocket by different cauſes.

1. A partial protruſion of the eye-ball takes place in ſeveral of the diſeaſes we have conſidered in the preceding ſections; particularly in the hypopyon, in the ſtaphyloma, and in dropſical ſwellings of the eye.

2. The eye may be diſplaced or puſhed from its ſocket by the effects of external violence. And,

3. It may be raiſed or elevated by tumours forming behind or beneath it.

Even the ſlighteſt degree of diſtortion or diſplacement of the eye affords a very frightful appearance; and to thoſe not accuſtomed to meet with it, gives much cauſe to ſuſpect that viſion will be completely deſtroyed by it. Every affection of this nature has therefore been in general conſidered as incurable: little or nothing has accordingly been attempted for removing them; ſo that patients labouring under them have for the moſt part been allowed to finiſh a miſerable exiſtence without any meaſures being employed for their relief. But although we cannot in every affection of this nature preſerve the power of viſion, yet in moſt inſtances we may do ſo; and wherever there is any probability of this being practicable, it ought always to be attempted.

As the means of cure to be employed muſt depend upon the cauſe by which the diſeaſe is induced, it is very material for practitioners to attend to this circumſtance. When the ball of the eye is morbidly enlarged from any of the cauſes we have mentioned; namely, from water, pus, or any other fluid being collected in any part of it, if a portion of it is by this cauſe puſhed out from the ſocket, all that art can do, is to diminiſh the ſize of the ſwelling in the manner we have already directed, either by puncture, inciſion, or perhaps by removing a portion of it. In moſt caſes of this kind, viſion will be irrecoverably loſt; but, by the means we have mentioned, the deformity produced by the diſeaſe may be commonly removed.

When, again, the eye-ball is puſhed from its ſocket by external violence, as the optic nerve will be ſuddenly ſtretched, we would à priori conclude, that viſion muſt neceſſarily be deſtroyed by it. This will probably be moſt frequently the caſe; but it does not always happen: for inſtances have occurred of the eye being puſhed ſuddenly and entirely out of the ſocket, and on its being replaced, of viſion being as perfect as it was before.

Several years ago I met with an inſtance of this, in which the eye was almoſt entirely turned out of its ſocket by a ſharp-pointed wedge of iron puſhed in beneath it. The iron paſſed through a portion of the ſocket, and remained very firmly fixed for the ſpace of a quarter of an hour; during which period the patient ſuffered exquiſite pain; he was quite blind in the affected eye; and the eye-ball being puſhed ſo far out as to give reaſon to ſuſpect a rupture of the optic nerve, it was doubted whether it would anſwer any purpoſe to replace it or not. As no diſadvantage, however, could occur from a trial being made of it, I reſolved to attempt it; and with much pleaſure and aſtoniſhment I found, on removing the wedge of iron, which being driven to the head was done with difficulty, that the power of viſion inſtantly returned even before the eye was replaced. The eye was now put eaſily into the ſocket; and the effects of inflammation being guarded againſt, the patient enjoyed very perfect viſion.

A caſe of a ſimilar nature to this is recorded by a very ingenious practitioner, Mr White of Mancheſter: In which the eye was ſtill more completely diſplaced than in the one I have mentioned, and in which the power of viſion was ſcarcely affected *.

The ſucceſs in both theſe inſtances ſhould prevent us from deſpairing in any caſe of this nature where the eye-ball remains entire, and where it is not altogether ſeparated from the contiguous parts, and they afford ſufficient evidence of no material inconvenience being experienced even

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* Vide Caſes in Surgery, &c. By Charles White, F. R. S. &c.

even from a ſudden extenſion of the optic nerve. No caſe therefore, of this kind, ſhould be conſidered as incurable, till it has actually proved to be ſo by the power of viſion being found to be entirely loſt after every endeavour for preventing it has failed. After every kind of extraneous matter is removed, the eye ſhould be cautiouſly replaced; and with a view to prevent or render moderate the inflammation, which otherwiſe there would be reaſon to expect to run high, blood-letting, both general and local, ſhould be adviſed, together with a very ſtrict antiphlogiſtic regimen. At the ſame time, too, light ſhould be excluded from the eye, and it ſhould be kept covered with any of the cooling ſaturnine applications.

When the eye-ball is protruded by a tumour ſituated beneath or behind it, the cure muſt depend entirely on a removal of the tumour. When an abſceſs or a collection of any kind of fluid is attended with this effect, a cure will ſometimes be obtained merely by laying the cyſt which contains the matter ſufficiently open: But when the tumour is of a firmer nature, nothing will prove effectual but the removal of it by extirpation.

It is neceſſary in this place to remark, that practitioners are in general too timid, in operating upon tumours of this kind, owing to their near contiguity to the eye; inſomuch, that, when a tumour is ſituated entirely within the orbit, a patient is commonly directed rather to allow it to remain, than to ſubmit to an operation. As long as no material inconvenience is experienced from ſuch tumours; when they are not likely to degenerate into a worſe nature; and when they appear to remain ſtationary without receiving any additional increaſe; it would ſurely be improper to adviſe a patient to undergo the pain and terror of an operation: But whenever they begin to acquire an additional bulk; when there is any reaſon to ſuſpect that they may ever become cancerous; and eſpecially when they begin to impede the motion of the eye, and to puſh it out of the ſocket; no farther delay ſhould be admitted. In ſuch circumſtances, the removal of the tumour is abſolutely neceſſary for the welfare of the patient; and as this muſt daily be rendered more difficult, it ought to be immediately attempted.

Even where tumours of this kind have acquired a conſiderable bulk, there is much leſs difficulty in removing them than is commonly imagined. By proceeding cautiouſly, they may often be taken out, even where they paſs to a conſiderable depth in the ſocket, without hurting the eye: But where the eye has already ſuffered, by being puſhed from its natural ſituation, as nothing but extirpation of the tumour can remove the diſeaſe, it ought always to be done, even although there ſhould be ſome riſk of the eye being hurt by it: For, beſides the injury which ſuch tumours do to the eye and other ſoft parts, when they increaſe to any conſiderable bulk, by preſſing upon the contiguous bones, they very commonly bring them likewiſe into a ſtate of diſeaſe. In ſome inſtances, the bones become carious, and produce tedious ulcers; but moſt frequently they ſwell, become ſoft, and on being laid open, inſtead of the uſual appearances of bone, they are found to conſiſt of a clear gelatinous matter. In this ſtate of the diſeaſe no advantage can be expected from extirpation, and it therefore ſhould not be attempted; but this diſtreſsful ſituation may very commonly be prevented, by the operation being employed more early.

It ſometimes happens, that the eye is puſhed from its ſocket by an enlargement of the glandula lachrymalis. This forms a kind of tumour, of more difficult management than any other to which theſe parts are liable: We ought not, however, even in this caſe, to deſpair of effecting a cure; for inſtances have occurred of this gland in an enlarged ſtate being entirely removed, without any injury being done to the eye-ball: and there will ſeldom be much difficulty in replacing the eye, on the cauſe being removed by which it was puſhed out.

SECTION XV.

Of Cancerous Affections of the Eye, and Extirpation of the Eye-ball.

THE eye, like every part of the body, is liable to diſeaſes, which, from a virulence in their nature, cannot be cured, and which therefore renders the removal of the diſeaſed part neceſſary, in order to prevent the affection from ſpreading to the contiguous ſound parts.

A great proportion of the diſeaſes of the eye may be cured by proper management: but when this is either neglected altogether, or is not duly perſiſted in, it ſometimes happens, eſpecially in caſes of violent ophthalmia, and in ſome inſtances of ſtaphyloma, that the diſeaſe degenerates into a real cancer: the eye-ball becomes enlarged, and protrudes beyond the boundaries of the ſocket; it acquires a firm and even a hard conſiſtence; the power of viſion is deſtroyed; and the tumour has commonly a red or fleſhy appearance. In ſome inſtances, a yellow glutinous matter, but moſt frequently a thin acrid ichor, is diſcharged from the ſurface of it. For a conſiderable time the patient complains only of a heat, or a ſenſation of burning in the ſwelling; but at laſt he becomes diſtreſſed with ſevere pains ſhooting through the ſubſtance of it, and acroſs the brain to the oppoſite ſide of the head.

In this ſituation, blood-letting, opiates, and the external uſe of emollient applications, are commonly adviſed, with a view to render the pain moderate; but although we may in ſome inſtances be able to accompliſh this by large doſes of opiates, yet no remedy will prevent the diſeaſe from ſpreading; and as it is always a matter of importance to remove cancerous tumours as early as poſſible, we ſhould never heſitate in recommending the operation, as ſoon as the diſeaſe appears evidently to be formed.

In a former publication, we entered fully into the conſideration of Cancer [*].

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[*] Vide Treatiſe on Ulcers, &c. Section VIII.

We there made it appear, that extirpation of the diſeaſed part, is the only remedy to be depended upon; that it often ſucceeds when employed early in the diſeaſe; that it muſt neceſſarily very frequently fail when it is long delayed; and that practitioners have till of late years been often blameable, by an ill-founded averſion to this operation, in preventing patients from ſubmitting to it. For a more particular diſcuſſion of this point, we muſt refer to the ſection we have mentioned; but it is here neceſſary to remark, that this general averſion to operate in caſes of cancer has been carried ſtill farther when the diſeaſe is ſeated in the eye, than when it occurs in any other external ſituation.

It is in general objected to the extirpation of cancer, that the diſeaſe is ſo very apt to return, that the advantage to be derived from it is ſeldom equal to the pain, trouble, and confinement which occur from it. This, we have elſewhere ſhown, is by no means the caſe: But when the diſeaſe is ſeated in the eye, another objection has been raiſed to it; namely, the hazardous nature of the operation; for as it is impoſſible, from the depth of the orbit, to ſecure any arteries by ligature which may be divided at the bottom of it, it has been ſuppoſed that much danger muſt occur from this circumſtance alone: And accordingly, although we find the method of extirpating the eye deſcribed in books, excepting by a very few practitioners the operation has been very ſeldom performed.

There is no cauſe, however, for this timidity; for although a good deal of blood is ſent to the eye by different branches of both the internal and external carotid arteries; yet at the place where theſe are divided in extirpating the eye, they are commonly ſo much ramified, that no hazard, ſo far as I know, has ever occurred from the operation: And I have not only done it myſelf, but have in different inſtances ſeen it performed by others. It is not the extirpation of a portion of the eye, namely, that part of it which protrudes beyond the orbit, which I now ſpeak of, but the total removal of the whole eye when the eye-ball is altogether diſeaſed. A partial extirpation of it is often indeed recommended, chiefly for the reaſon I have mentioned, the danger which is ſuppoſed may occur from a deep diviſion of the ocular artery; but whenever the eye is in a cancerous ſtate, as all the diſeaſed parts muſt be removed in order to render the patient in any degree ſafe; as we have endeavoured to ſhow that the eye may be altogether cut out without any kind of hazard; and as no advantage can be derived from allowing a portion of it to remain, we ſhould never heſitate in removing the whole. The method of performing the operation is this.

The patient ſhould either be firmly ſeated in a proper light, with the head ſupported by an aſſiſtant, or, what anſwers better in every tedious operation, he ought to be laid upon a table with his head upon a pillow; the moſt convenient poſture not only for himſelf, but for the operator. When the eye-lids are diſeaſed, it is neceſſary to remove them along with the eye itſelf; but when they are ſound, they ſhould be allowed to remain as a protection to the orbit. By means of two flat hooks, one of which is repreſented in Plate XXIX. fig. 6. the palpebræ may be much ſeparated by aſſiſtants; and this being done, the ſurgeon is to proceed to the operation.

When the eye-ball has acquired ſuch a ſize as to cauſe it protrude beyond the orbit, the operator will in general be able to lay hold of it with his fingers; but when this cannot be done, a broad flat ligature ſhould be introduced through the centre of it, in order to ſecure it during the operation. While this is done with one hand, the ſurgeon, with a common ſcalpel in the other, muſt endeavour to ſeparate by ſlow diſſection the whole ball of the eye from the different parts to which it is connected. All the diſeaſed parts ſhould be removed: but care ſhould be taken not to injure the bones; for as in ſome parts of the orbit they are extremely thin, a good deal of miſchief might enſue from their being much hurt.

On the eye being taken out, the attention of the operator is neceſſarily directed to the hæmorrhagy: but although in ſome inſtances this may take place to a conſiderable degree, yet this is very ſeldom the caſe; for in general, any diſcharge of blood which occurs here ſcarcely requires the aid of compreſſion to put a ſtop to it. But whenever it happens that the hemorrhagy continues longer than is judged proper, it may be very eaſily commanded by preſſure alone; or, a piece of dry ſponge being applied to the mouths of the bleeding veſſels, preſſure may be applied along with it, by ſtuffing the reſt of the orbit with ſoft lint, and applying a napkin over the whole, ſo as to make it preſs with ſome firmneſs upon the ſponge beneath.

When ſponge, however, is employed, ſome attention is neceſſary in the application of it; for whenever ſponge is applied to the mouth of a bleeding artery, it adheres with ſuch firmneſs, as renders a good deal of force, as well as ſome management, neceſſary to remove it. Before inſerting the ſponge, therefore, a piece of ſtrong waxed pack-thread ſhould be tied to it; by which it may be pulled out when there is no farther riſk of hemorrhagy.

As ſoon as a free ſuppuration takes place, the bandage and lint will be eaſily removed; and the only dreſſing that can be neceſſary will be a pledgit of any emollient ointment, to be continued as long as any diſcharge of matter is obſerved from the orbit.

In performing this operation, we have directed the common ſcalpel to be employed; and we have no heſitation in ſaying, that it is preferable to any inſtrument that has yet been propoſed. Different forms of ſcalpels may be ſeen in books of ſurgery which have been invented for this operation, particularly one with a conſiderable degree of curvature. As this has been in ſome inſtances employed, I have thought proper to give a delineation of it in Plate XXXVIII. But it does not anſwer the purpoſe ſo well as the ſtraight ſcalpel; and in uſing it, we are more apt to injure the bones of the orbit.

The operation we have deſcribed, namely, the extirpation of an eye, is attended with much pain to the patient, and appears to be of a cruel and dangerous nature to bye-ſtanders; ſo that few ſurgeons have reſolution to perform it. It ought in no inſtance to be adviſed where there is any poſſibility of effecting a cure by means of a more gentle nature; but when this cannot be done, and when a patient will for certain die in miſery if the eye is not removed, it ought ſurely to be recommended as a means that may afford at leaſt ſome chance of ſafety: For although it will not always prove ſucceſsful, yet we know from experience, that in ſome inſtances lives have been ſaved by it, which otherwiſe would in all probability have been loſt. We ought always, however, to remember, in every caſe of cancer, that extirpation proves, cæteris paribus, moſt ſucceſsful when practiſed early: So that this ought always to be adviſed as ſoon as it is evident that the diſeaſe is clearly formed.

SECTION XVI.

Of Artificial Eyes.

AS the loſs of an eye is always attended with much deformity, our being in ſome meaſure able to obviate this, is not unfrequently a deſirable object; and by the ingenuity of modern tradeſmen, it is very eaſily accompliſhed.

A thin concave plate of glaſs, ſilver, or of gold, being fitted to the orbit, muſt be coloured ſo as to match the other eye as exactly as poſſible; and if care be taken to render it perfectly ſmooth, it may be introduced beneath the palpebræ, and uſed without pain being excited. Of all theſe ſubſtances, however, glaſs is the moſt proper; for it not only can be made to reſemble the natural eye more exactly, but it is much more cleanly.

An artificial eye may be fitted to any orbit, where the eye has either been ſunk by the evacuation of part of its contents, or where a portion of the eye-ball has been removed: But much advantage is ſeldom derived from this invention where the globe of the eye has been entirely taken away; for when it is not ſupported beneath, the artificial eye ſinks too much into the orbit, and can never be made to fit it properly. It is chiefly, therefore, in caſes of hydrophthalmia and of ſtaphyloma in which it has been found neceſſary to evacuate a portion of the contents of the eye, or perhaps to remove ſome part of it, that artificial eyes prove moſt uſeful.

SECTION XVII.

Of CATARACTS.

§ 1. *General Remarks on Cataracts.*

VARIOUS definitions have been given of the term Cataract; ſome of which are ſufficiently applicable, but others have rather tended to convey an improper idea of the nature of the diſeaſe.

Blindneſs, induced by a white opake body immediately behind the iris, forms the diſeaſe we name Cataract; and as we find from diſſection that this opacity is in every inſtance ſeated in the cryſtalline lens, or in its inveſting membrane, a cataract may with propriety be defined, to be a deprivation of ſight induced by an opake ſtate of the lens or of its capſule.

The real ſeat of the cataract being a late diſcovery, we need not wonder at finding very perplexed and contradictory opinions concerning it in all our ancient chirurgical authors. By ſome it was conſidered as an affection of the internal ſurface of the cornea; others imagined that it was ſeated in the vitreous humour; whilſt by a great proportion of practitioners it was ſuppoſed to be produced by a new formation of a membranous ſubſtance within the cavity of the eye. By ſome this new production was ſuppoſed to be attached to the coats of the eye: But others alleged that it uſually continued looſe, and floated in the aqueous humour. Some writers of eminence, too, appear to have confounded the gutta ſerena with this diſeaſe, the former being often mentioned and deſcribed under the name of the Black Cataract.

The fact, however, is now aſcertained, that the cataract, in a pure unmixed form, depends entirely on an affection of the lens; and its appearance indeed is ſo diſtinctly marked, that no practitioner of experience can ever be miſtaken with regard to it: But for the advantage of thoſe who may not be accuſtomed to this branch of buſineſs, we ſhall, in the firſt place, give a ſhort hiſtory of the riſe and progreſs of the diſeaſe; and ſhall afterwards endeavour to point out ſuch circumſtances as diſtinguiſh it more particularly from ſome other affections to which the eye is liable.

Inſtances have occurred, in which cataracts have been ſuddenly formed; a total loſs of ſight, with a very conſiderable degree of opacity in the lens, taking place at once without any previous affection. This, however, is rare; and it commonly happens, that the diſeaſe approaches in a very gradual manner, from a ſlight degree of dimneſs, with which it commences, to an entire loſs of the power of viſion.

The firſt ſymptom which generally occurs in cataract is what the patient uſually terms a weakneſs of ſight, and which commonly takes place long before any alteration is perceived in the ſtate of the lens. By degrees this weakneſs, or rather dimneſs of the eye, becomes more conſiderable; and the patient, being from his feelings led to ſuppoſe that it is in ſome meaſure produced by duſt or motes floating in the air, or by ſome opake matter upon the external ſurface of the cornea, is often employed in rubbing his eyes; and is ſurpriſed to find that his ſight never becomes clearer from his doing ſo.

If in this ſtate of the diſeaſe the eye be examined, the lens will be obſerved to have acquired a duſky hue; and inſtead of being perfectly clear and diaphanous, which it naturally is, it will be found to be ſlightly opake. By degrees the dimneſs of ſight becomes more troubleſome, till at laſt it terminates either in total blindneſs, or perhaps the patient may be able to diſtinguiſh light from darkneſs; but in the advanced ſtages of the diſeaſe, he can ſeldom diſtinguiſh colours, nor can he find his way in roads where he is not perfectly acquainted.

In proportion to the degree of blindneſs which takes place, the lens is obſerved to become more and more opake, till at laſt it is found to be either entirely white, or of a light gray or pearl colour. In a few inſtances this whiteneſs is confined to a ſmall portion of the lens, and forms a ſmall opake ſpot in ſome particular part of it. In general, however, the whole body of the lens is equally affected.

During the whole courſe of the diſeaſe, the pupil contracts and dilates according to the degree of light in which it is placed; at leaſt this will be always obſerved when the eye is not otherwiſe diſeaſed. Cataracts, however, are often combined with a gutta ſerena; in which caſe the pupil will not be affected by any degree of light that can be applied to it: But this does not proceed from the ſtate of the lens, but from the diſeaſed ſtate of the optic nerve.

Cataracts are not commonly attended with pain; but in ſome inſtances it is otherwiſe, and every expoſure to light creates a good deal of uneaſineſs. But this we ſuppoſe to depend upon ſome degree of inflammation at the bottom of the eye, with which the cataract may be connected; for it is never to be conſidered as a neceſſary ſymptom of the diſeaſe.

We have already obſerved, that the cataract has been confounded with other diſeaſes. This can happen only, however, from great inattention; for there is ſcarcely any affection of the eye to which it bears much reſemblance. But in books, we find it has been miſtaken for the gutta ſerena, for the hypopyon and ſtaphyloma; and it has been confounded with white opake ſpots upon the cornea.

It is eaſily diſtinguiſhed, however, from all of theſe. From the firſt of them, by the pupil contracting when expoſed to much light, and by a white opake body being obſerved behind the iris: whereas in the gutta ſerena, the pupil remains in a ſtate of dilatation whatever degree of light may be applied to it, and no opacity is obſerved at the bottom of the eye. It was formerly indeed imagined, that the gutta ſerena was a variety of cataract not ſo frequent as that in which the lens is of a white or gray colour; but the diſeaſe was ſuppoſed to be of the ſame nature, and was accordingly diſtinguiſhed by the name of the Black Cataract. But we have already remarked, that there is no foundation for this diſtinction.

The cataract is readily diſtinguiſhed from the other diſeaſes we have mentioned, namely, from the hypopyon, ſtaphyloma, and white ſpots upon the cornea, by the evident marks of diſeaſe which in all of theſe takes place in the anterior part of the eye, the cornea itſelf; which in all of them is opake, and which in the hypopyon and ſtaphyloma is commonly elevated into a ſmall tumour or protuberance: whereas in cataracts, the only ſymptom which occurs is blindneſs to a greater or leſſer degree, attended with a white opake ſpot behind the iris, the cornea and every other part of the eye remaining perfectly ſound. We have already obſerved, that this opacity is found by diſſection to depend upon a morbid ſtate of the lens. For the moſt part it is the body of the lens itſelf that is diſeaſed; ſo that the opacity is removed, and the eye appears perfectly clear on the cryſtalline being taken out: But in a few inſtances, the membrane or capſule which ſurrounds the lens is the ſeat of the diſeaſe; ſo that the ſame degree of opacity ſtill continues even after the lens is removed from the eye.—This, however, is by no means a frequent occurrence; but it has now and then been met with, and is termed the Membranous Cataract.

It is difficult, or perhaps impoſſible, to aſcertain the proximate cauſe of cataract; but I think it probable, that it conſiſts in ſome degree of obſtruction of the veſſels of the lens, in ſome inſtances induced by external violence, but moſt frequently by ſome internal cauſe which we cannot properly account for.

The exiſtence of veſſels in the cryſtalline is doubted indeed by many, who imagine that nouriſhment is conveyed to it by a fluid which is met with in a very ſmall quantity within the capſule of the lens.—But the fact I believe is now eſtabliſhed, that the lens is ſupplied with veſſels from its capſule, injections having been made to paſs from one to the other, not only in different animals, but in ſome inſtances in the human eye. But whether this could have been demonſtrated or not, the exiſtence of veſſels in the lens, is rendered I think, ſufficiently probable, by a circumſtance I took notice of in the hiſtory of the diſeaſe, namely, the ſudden formation of cataracts, which in a few caſes has been obſerved. I have myſelf met with two inſtances of this; in one of which the moſt complete degree of opacity took place in the cryſtalline in the courſe of a few hours from the firſt ſenſation of dimneſs in the affected eye. A fact which cannot be ſo readily explained on any other ſuppoſition.

It may be alleged, where the cataract is ſo ſpeedily formed, that the opacity may probably ariſe from ſome affection of the veſſels of the capſule, and not of the lens itſelf. In ſome inſtances this may be the caſe; but in one of theſe I have alluded to, the diſeaſe appeared to be fixed in the body of the cryſtalline, the capſule remaining perfectly ſound; for in this caſe the lens was extracted, which removed the opacity completely.

In confirmation too of this opinion of cataracts being probably produced by ſome degree of obſtruction in the veſſels of the lens, we may remark, that they occur more frequently in women about the time of the menſes diſappearing than at any other period of life: And we know that this period is particularly productive of obſtructions in other parts of the body, eſpecially of ſcirrhous and other glandular tumefactions.

So long as the opinion prevailed of there being different ſpecies of cataracts, a variety of means were recommended in the treatment of them; but now that the real nature of the diſeaſe is known, our ſole object is to remove the opacity of the lens; or, when this cannot be accompliſhed, to remove the lens itſelf from the axis of viſion.

In confirmed cataracts of long duration, we are not to expect that much advantage will be derived from any internal medicine;

cine; but in the incipient ſtate of the diſeaſe, before the opacity of the cryſtalline is complete, mercury has in ſome inſtances proved ſerviceable. When any degree of inflammation occurs, blood-letting, with a ſtrict antiphlogiſtic regimen, will ſometimes be indicated. But for the removal of opacity alone, nothing I have ever tried anſwers the purpoſe ſo effectually as ſmall doſes of calomel frequently repeated. Extractum hyoſcyami, flammula jovis, and other vegetable productions, have likewiſe been celebrated for their efficacy in caſes of cataract; but I cannot from my own experience ſay any thing with reſpect to them.

When mercury, or any other remedy that is employed, is found to fail in removing the opacity of the lens, our next object, as we have ſaid, is to remove the diſeaſed lens from the axis of viſion; which we accompliſh by one or other of two chirurgical operations, namely, by preſſing the lens from its natural ſituation in the centre down to the bottom of the eye, an operation commonly termed Couching the Cataract; and that operation which we denominate Extraction of the Lens, by which the diſeaſed cryſtalline is removed entirely from the eye.

Each of theſe operations has been much employed; ſo that the merits of both ought long ago to have been aſcertained: But although the ſubject is of much importance, it ſtill remains in a ſtate of uncertainty. By ſome practitioners couching is preferred; whilſt others conſider extraction of the lens as the only remedy on which we ſhould place any dependence.

The uncertainty in which we ſtill remain upon this point, proceeds, I believe, from this branch of practice having hitherto been for the moſt part in the hands of itinerants: And as gentlemen of this denomination, have uniformly, from their firſt outſet in life, adopted one method of operating only, they have very univerſally condemned the other; which they themſelves neither practiſe, nor perhaps underſtand: So that regular practitioners, not being able to determine from their own experience, have in general remained upon this point very undecided. But the public appearing now to be convinced of the propriety of intruſting this, as well as every other operation of importance, to eſtabliſhed ſurgeons of reputation, opportunities will thus be afforded of determining the point in queſtion by experiment; the only means by which any degree of certainty can be obtained.

In proſecuting the conſideration of this ſubject, I ſhall endeavour to point out as clearly as poſſible the reſult of my own obſervation upon it, together with that of ſome of our beſt employed ſurgeons. With this view, I ſhall firſt deſcribe the operation of couching; and after conſidering the different ſteps of the operation of extracting the cataract, I ſhall attempt to draw a juſt compariſon of the merits of the two.

§ 2. *Of* COUCHING, *or* DEPRESSION *of the* CATARACT.

WE have already obſerved, that the operation of couching conſiſts in preſſing the cataract or diſeaſed cryſtalline lens from its natural ſituation in the centre down to the bottom of the eye. By this means the opacity producing the diſeaſe is removed from the axis of viſion; and although the ſight will never be ſo perfect as it was before the lens became opake, if the eye is otherwiſe ſound it will be quite ſufficient for the common purpoſes of life.

In the antomical deſcription of the eye, which makes the ſubject of the firſt part of this chapter, we have ſeen, that the lens is placed immediately behind the pupil, where it is lodged in a ſlight depreſſion of the vitreous humour, to which it is attached by a capſule formed by a portion or lamella of the tunic which includes the vitreous humour itſelf. In couching, the lens is ſeparated from its capſule; and being preſſed down behind the iris, if the operation ſucceeds, it either remains there during life, or is diſſolved in the aqueous humour in which it is lodged.

Before we proceed to this operation, there are ſome circumſtances which particularly require our attention; the moſt material of which are, the degree of opacity which occurs in the lens, and the ſituation of the eye with reſpect to other diſeaſes.

It is a fact known to practitioners, that no operation of importance can be performed upon the eye, without being attended with ſome hazard of inducing inflammation; which proves tedious, or otherwiſe, according to the conſtitution of the patient, and other circumſtances of the caſe. This points out the propriety of proceeding with much caution, and of attempting no operation of this kind that is not abſolutely neceſſary for the welfare or comfort of the patient. Where a patient is rendered ſo blind by cataracts in both eyes, that he cannot conduct himſelf in the ordinary occurrences of life, we ſhould not heſitate in adviſing an operation for his relief. In ſuch circumſtances, any riſk of his ſuffering from inflammation is more than counterbalanced by the advantages he will probably derive from the operation. But when one eye only is affected,

fected, and where therefore the patient enjoys a perfect uſe of the other: Or, where both eyes even are diſeaſed, if the opacity of the cryſtallines is not ſo conſiderable as to prevent the patient from managing his ordinary buſineſs; or if it does not deprive him of his ſight in any remarkable degree; in any of theſe circumſtances, a prudent practitioner will rather avoid an operation, and will adviſe it to be delayed as long as viſion remains tolerably perfect.

When the eye is otherwiſe ſound, the circumſtance we have mentioned of viſion not being much impaired is almoſt the only one which ſhould preclude the operation: But it often happens, that together with an opake ſtate of the cryſtalline, the eye is in other reſpects ſo much diſeaſed, as to afford no hopes of viſion being reſtored by a removal of the cataract: In which caſe, as no advantage could be derived from an operation, it ought not to be recommended. This is particularly the caſe in the hypopyon, in the gutta ſerena, and in every affection of the eye attended with an opake ſtate of the cornea.

Writers on this ſubject mention another reaſon, which they allege ought to have conſiderable weight in determining the propriety of operating in every caſe of cataract. It has very univerſally been ſuppoſed, that a cataract ought to be in a particular ſtate, in order to inſure ſucceſs from an operation, inſomuch that we are adviſed never to operate unleſs this ſtate of the diſeaſe is found to prevail. The ſtate I allude to, is a ſuppoſed ſtate of maturity, which it is believed every cataract will ſooner or later arrive at, and which is ſaid to be clearly and evidently pointed out by certain appearances of the opake cryſtalline.

It is true, that both in the operation of couching and of extracting the cataract, the lens is ſometimes found to be partly ſoft and in part very firm, and in a few caſes it is even perfectly fluid; a circumſtance commonly conſidered as unfavourable: But although this, we believe, may have firſt ſuggeſted the idea of the unripe ſtate of a cataract, as it is termed, yet no advantage has hitherto been derived from the diſtinction; for notwithſtanding a variety of ſigns have been mentioned, by which the real ſtate of a cataract is ſaid to be evidently marked, yet this is not found to be ſupported by experience: On the contrary, indeed, it often happens that a cataract proves to be of a firm texture, which was previouſly ſuſpected to be ſoft; and vice verſa.

Nothing, indeed, can render it more clear that this idea reſpecting the mature ſtate of a cataract is ill-founded, than the variety of opinions which prevail reſpecting it: For while by ſome it is ſaid that this ſtate of the diſeaſe is indicated by a pure white or milky appearance, it is aſſerted by others, that a light gray or pearl colour is the only certain mark of it. Now, the fact is, that the real ſtate of a cataract can never be known from the colour of it; and the beſt informed practitioners will allow, that no advantage is to be derived from any diſtinction of this nature.

The idea of a cataract being more ripe or mature at one period of the diſeaſe than another, originated, as we have ſaid, from this circumſtance of the cryſtalline being in ſome inſtances found to be fluid, which gave cauſe to ſuſpect that the firſt effect of a cataract is to induce a ſoftneſs of the lens, and that this ſoft or fluid ſtate of it is gradually altered by the progreſs or continuance of the diſeaſe, till it acquires at laſt a firm conſiſtence, when it is ſuppoſed to be thoroughly ripe.

This opinion, however, of the firſt effect of cataracts upon the lens is equally ill-founded with the idea we have mentioned of the real ſtate of the diſeaſe being to be diſtinguiſhed by the external appearances of it; for we know from experience, that cataracts are often of a firm texture from the beginning. From my own obſervation indeed upon this point, I would ſay, that the moſt frequent effect of cataracts upon the lens is to produce a preternatural degree of hardneſs of it; as, for the moſt part, an extracted opake cryſtalline is of a firmer conſiſtence than it is ever found to be in a healthy tranſparent ſtate.

We are therefore to conclude, with reſpect to this circumſtance of the ripe or unripe ſtate of a cataract, that in the treatment of the diſeaſe, no advantage is to be derived from any thing we yet know concerning it. In the common acceptation of the term, indeed, the word ripeneſs has in this reſpect no determined meaning affixed to it: I would therefore propoſe, that inſtead of being employed to ſignify the *appearances* of a cataract, it ſhould be applied only to expreſs the *effects* produced by it. In this manner, the term might ſtill be retained with propriety: for we might very properly ſay that a cataract is ripe when the patient is rendered entirely blind by it, and when therefore it is ready for an operation; and, on the contrary, that the diſeaſe is ſtill in an unripe ſtate ſo long as viſion is not much impaired by it.

As this circumſtance, with reſpect to

the conſiſtence of a cataract, is much inſiſted upon by the moſt part of authors who have wrote upon it, I judged it proper to enter into a particular conſideration of it: And, upon the whole, this concluſion I think may be drawn, that in determining upon the propriety of operating, we are never to place any dependence on the appearance of the lens; and that we are to be ſolely directed by the effects produced by the cataract, and by the ſtate of the eye with reſpect to other diſeaſes. As long as viſion remains tolerably perfect, whether in both or only in one eye, for the reaſons we have already given, a prudent practitioner would rather avoid operating: But when the ſight becomes much impaired, if the cornea is found to be tranſparent, and if the pupil admits of a full dilatation and contraction, according to the degree of light to which it is expoſed, we ſhould not heſitate in adviſing an operation as the only effectual means of relief. And when it is reſolved upon to couch or depreſs the cataract, the following is the method of effecting it.

As it is of importance in this as well as in every operation upon the eye, to guard againſt inflammation, nothing ſhould be omitted that can in any meaſure tend to prevent it: For this reaſon, the patient ſhould be confined, for ſeveral days before the operation, to a low regimen; and two or three doſes of ſome cooling laxative ſhould be exhibited at proper intervals.

An apartment ſhould be fixed upon that is perfectly light: but during the operation the ſunſhine ſhould not be admitted; for by irritating the eye, it prevents it from being kept ſo ſteady even with a ſpeculum as it otherwiſe may be. A north expoſure ought therefore to be preferred.

The only apparatus to be provided for this operation is, a ſpeculum of a proper conſtruction, and of a ſize adapted to that of the eye; and a particular form of an inſtrument, termed a needle, for the purpoſe of depreſſing the cataract. Different forms of the needle are repreſented in

Plate XXXII. and in Plate XXX. is delineated different views of the moſt uſeful ſpeculum that has yet been invented.

As it is of much importance to have the eye properly fixed during the whole courſe of the operation, and as this cannot be done effectually in any other manner than by a ſpeculum exactly fitted to the eye, every operator ſhould be provided with ſeveral ſizes of this inſtrument.

The beſt needle for this operation is that of a flat form, repreſented in Plate XXXII. fig. 1.

The patient ſhould be placed upon a low ſeat with his face towards the window, and the ſurgeon, upon a chair conſiderably higher, ſhould be ſeated directly before him: An aſſiſtant ſtanding behind muſt be directed to place the patient's head upon his breaſt, while he ſecures it in this ſituation by his right hand under the chin, and his left placed upon the forehead: And in order to prevent any interruption during the operation, the hands ſhould be properly ſecured by an aſſiſtant on each ſide.

During

PLATE. XXXII.

FIG. 1.

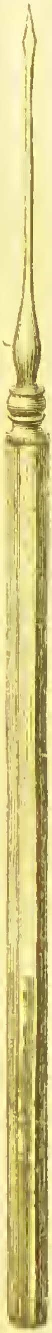


FIG. 2.

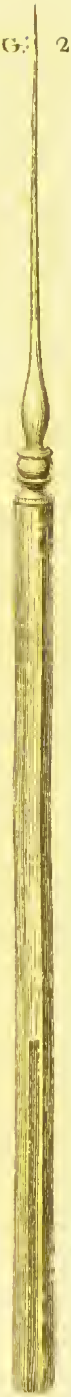


FIG. 3.

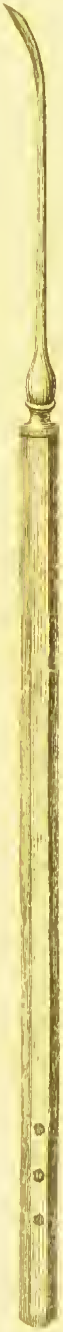


FIG. 4.

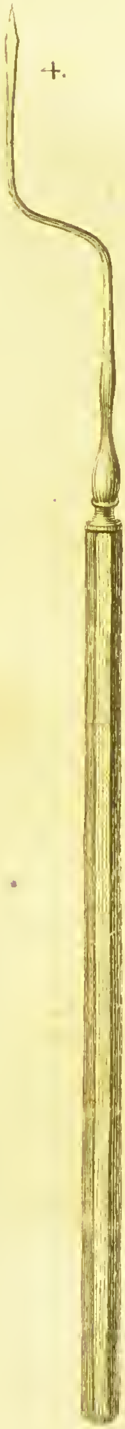
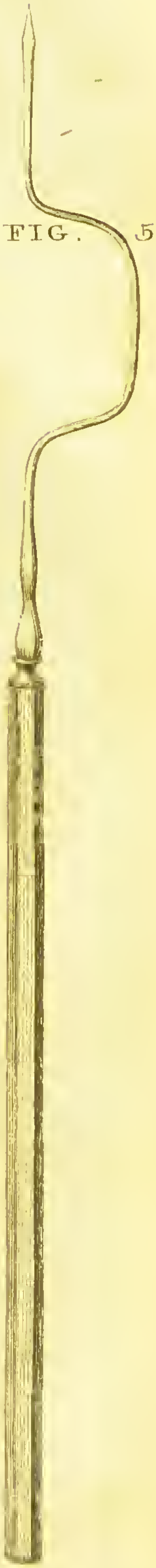


FIG. 5.



[illegible]

During the operation, it is of much importance for the ſurgeon to have his hand firmly ſecured; even the moſt trifling circumſtance ſhould be attended to that can have any effect in accompliſhing this. For this purpoſe, nothing will be found to prove ſo effectual as a proper reſt being provided for the elbow. The elbow ſhould therefore be placed either upon a table, or upon the knee of the operator, raiſed to ſuch a height that it may be nearly in a line with the eye of the patient. Surgeons in general truſt to the hand being properly ſecured by the ring and little fingers reſting upon the cheek or temple of the patient: but this ſeldom proves ſufficient for the perfect ſteadineſs required in every operation upon the eye; and whoever will make trial of the mode we have recommended of fixing the elbow, will find it to be much preferable. It is proper, indeed, that any advantage to be derived from reſting theſe two fingers upon the cheek ſhould be likewiſe laid hold of; but this alone ought never to be depended on.

The aſſiſtant is now to raiſe the upper eye-lid with the fingers of his left hand; and the ſurgeon applying the groove in the upper part of the ſpeculum, in ſuch a manner that it may receive the edge of the eye-lid, the opening or circle formed by the brim of the ſpeculum is to be preſſed upon the ball of the eye, till the tranſparent cornea, and nearly about an eighth part of an inch of the ſclerotica, is protruded; by which means, if a ſteady and equal preſſure be continued upon the eye, it will be kept firmly fixed without any injury being done to it, at the ſame time that a ſufficient quantity of the ball will be left uncovered by the ſpeculum for the purpoſe of the operation.

We are at preſent ſuppoſing that the operation is to be performed upon the left eye. For this purpoſe, the patient being ſecured in the manner we have directed, the ſpeculum being applied and ſecured by the ſurgeon's left hand, and the ſurgeon himſelf being ſeated, and having fixed the elbow of his right arm at a proper height, he muſt take one of the couching needles in his right hand, and having fixed it, as we do a pen in writing, between the thumb and fore and middle fingers, while the ring and little fingers are made to reſt upon the cheek of the patient, the point of the inſtrument muſt now be carried forward paſt the external canthus of the eye; and being brought nearly into contact with the ſclerotica, it muſt be quickly plunged through this coat ſomewhat below the centre of the eye and about one-tenth of an inch behind the iris. There is delineated in Plate XXXIV. fig. 1. a repreſentation of the needle paſſed into the eye; by which a better idea is given of the operation than can be done by any deſcription.

In order to avoid the iris with as much certainty as poſſible, the inſtrument muſt be introduced with its flat ſurface towards this membrane, and ſhould be carried forward in this direction till the point of it is diſcovered behind the pupil, as is repreſented in the above-mentioned figure. By depreſſing the handle of the needle, the point of it is thus to be raiſed; and the flat ſurface of it being turned downwards, it muſt in this direction be puſhed into the upper part of the cryſtalline, when the operator, by elevating the handle, muſt endeavour to carry the lens upon the point of the inſtrument down to the bottom of the eye; which will be inſtantly diſcovered by the ſurgeon obſerving through the pupil that the cataract diſappears, and by the patient diſcovering more light than he has for ſome time been accuſtomed to.

Were we certain that the lens would continue at the bottom of the eye, the needle might now be withdrawn, and the operation would be finiſhed: but as we know from the anatomy of the eye, that there is a portion of the aqueous humour lodged between the vitreous humour and the iris; as it is into this part of the aqueous humour that the cryſtalline is depreſſed; and as this humour is of a conſiſtence too thin for preventing the action of the muſcles of the eye from raiſing the lens again on the preſſure of the inſtrument being withdrawn; we need not be ſurpriſed at the operation being frequently found to fail on its being finiſhed in this manner.

Inſtead of this, on the cryſtalline being preſſed to the bottom of the eye, it ſhould be ſlowly carried on the point of the inſtrument towards the outer and back part of the eye; a movement which is eaſily accompliſhed by the operator raiſing his hand ſo as to elevate the handle of the needle, at the ſame time that it is made to paſs ſomewhat outward over the cheek. By this means, the cryſtalline will be partly lodged below the vitreous humour; which being of a firm conſiſtence, very commonly prevents it from riſing again; and being brought towards the external canthus of the eye, if it ſhould afterwards be forced up by the action of the muſcles, not being oppoſite to the pupil, the paſſage of light to the retina will not be much obſtructed, and viſion will accordingly be ſcarcely more affected than if the cataract had remained at the bottom of the eye.

As ſoon therefore as this movement is effected, the needle ſhould be withdrawn; and there being now no farther uſe for the ſpeculum, it ſhould likewiſe be taken off: But as it is of importance to have the eye properly fixed during the whole courſe of the operation, the ſpeculum ſhould not be removed till it is entirely finiſhed.

On the inſtrument's being taken away, it is uſual to try what effect may be expected from the operation, by preſenting different objects to the patient: but altho' there may be no harm in ſlight trials of this kind, they ought not to be carried far; for miſchief may be produced, while no advantage can be derived from them.

After the operation, a compreſs of ſoft lint, ſoaked in a weak ſaturnine ſolution, ſhould be lightly applied over the eye; and this being retained by the common bandage for the head, a triangular napkin, the patient ſhould be confined in a dark apartment, and ſhould be kept upon a low regimen ſo long as there is any riſk of much inflammamation: With the view, too, of preventing inflammation, a doſe or two of a briſk purgative may be exhibited; and, when neceſſary, blood ſhould be taken from the temporal artery, from the jugular vein, or from the neighbourhood of the eye, by means of leeches.

In the courſe of three or four days, when there is little riſk of the eye being hurt by being uncovered, the bandages may be removed; when it will in general be known whether the operation has ſucceeded or not: For even when no immediate advantage is derived from the operation, the patient remaining for a ſhort while perhaps equally blind as before, he ſometimes gradually recovers the power of viſion, ſo as to diſtinguiſh objects with as much exactneſs as if the operation had proved ſucceſsful from the firſt. Inſtances have occurred of the ſight becoming gradually better for ſeveral months after the operation; which we ſuppoſe to happen from ſome degree of obſtruction having taken place in the capſule of the lens, and which cannot be ſpeedily removed.

On removing the coverings from the eye, if the cataract is not obſerved to be oppoſite to the pupil, the object of the ſurgeon is completed; but if it has again got into its uſual ſituation, after a farther delay for the purpoſe of allowing the inflammation induced by the firſt operation to ſubſide entirely, another trial muſt be made with it: and it frequently happens, that a ſecond or third attempt will prove ſucceſsful when the firſt had failed entirely. This, however, is in a great meaſure owing to the circumſtance we have mentioned, of the needle being withdrawn immediately on the lens being preſſed to the bottom of the eye; for this being done, it is in general ſuppoſed that the operation is finiſhed. We have endeavoured, however, to ſhow, that this is by no means the caſe; and by preſſing the cataract towards the external canthus of the eye, at the ſame time that it is gently puſhed beneath the vitreous humour, that it will very ſeldom be found to riſe again.

Thoſe who are not accuſtomed to this mode of operating, will perhaps object to it, that by forcing the lens into the vitreous humour, an unneceſſary violence is thus done to this humour, by which it muſt be ſo much injured, as to have ſome effect in preventing the operation from proving ſo ſucceſsful as it otherwiſe might do. This, however, is not upon experience found to be of any importance; for I have often done the operation in this manner, and I never obſerved any inconvenience to proceed from it. We ſhould not wantonly do any thing to hurt the vitreous humour; but we know that it is often much more materially injured in extracting the cataract without much detriment enſuing, than it can ever be in the operation of couching. Thus it often happens, in extracting the lens, that a conſiderable portion, or even the whole, of the vitreous humour is diſcharged, and yet the operation proves perhaps as ſucceſsful as if no ſuch accident had occurred. This is an accident, indeed, that every operator would rather wiſh to prevent; but it ſhows clearly, that no injury of importance can be done to viſion by the practice we have mentioned,

tioned, of lodging the cataract in the operation of couching, partly beneath, or even in the ſubſtance of the vitreous humour.

The operation we have deſcribed is ſuppoſed to be done, as we have already obſerved, upon the left eye; for which purpoſe the right hand of the operator muſt be employed: But in performing upon the right eye, if the needle is to be entered in the uſual way from the outer or external canthus of the eye, it muſt either be done by the left hand of the ſurgeon, or, if he wiſhes to uſe his right hand, he muſt either ſit or ſtand behind the patient, when, by ſupporting the head upon his breaſt or upon his knee, he may in this manner accompliſh his purpoſe. This mode of operating upon the right eye has been frequently practiſed even by ſurgeons of eminence, but it is extremely awkward; and beſides, the operator can never have ſuch a full command of the eye when he ſits or ſtands behind, as when he is placed before the patient. There are few ſurgeons, however, ſo alert at uſing their left hand, as to render it proper for them to perform this very nice operation with it; ſo that with the uſual inſtruments there is no other alternative than that of doing it from behind. But in Plate XXXII. figs. 4. and 5. there is delineated a form of needle, by which the operation may be done with perfect eaſe and ſafety on the right eye with the right hand of the ſurgeon, whilſt he is ſeated before and oppoſite to the patient. Only in this caſe, inſtead of entering the inſtrument at the uſual place, by puſhing it inwards from the external canthus of the eye, it muſt be entered at the internal angle and puſhed outwards, as is repreſented in Plate XXXV. fig. 1. In every other reſpect the operation is to be conducted as we have already directed; only the cataract, inſtead of being carried to the external canthus of the eye, muſt in this caſe be drawn by the point of the needle towards the noſe. In this manner the operation may be done upon the right eye by any ſurgeon who can perform it upon the left;

an improvement of much importance in the treatment of this diſorder.

As the operation of couching is very univerſally performed without the aſſiſtance of a ſpeculum, it may be conſidered as an affectation of ſingularity to recommend one. In anſwer to this, I muſt obſerve, that although the cataract may be depreſſed without the uſe of a ſpeculum, it may be done more perfectly, and with more eaſe both to the patient and the ſurgeon, when a ſpeculum is employed, than when it is not. By means of the ſpeculum, delineated in Plate XXX. the eye may be very firmly fixed, which allows the operator to manage the needle with more eaſe than can otherwiſe be done.

It has been commonly objected to the uſe of a ſpeculum, that it does not ſecure the eye ſufficiently; and that it always proves detrimental, by exciting inflammation over the eye-ball. This obſervation, I believe, is very well founded with reſpect to the inſtrument in ordinary uſe, of which a delineation is given in fig. 4. Plate XXXI.

But it does not apply to the other; which, when properly fitted to the ſize of the eye, ſecures it exactly; and when finely poliſhed, it is never productive of any inconvenience. As this is the firſt delineation that has ever, ſo far as I know, been given of this inſtrument, and as it appears to me to be an improvement of the higheſt importance, not only in couching, but in the operation of extracting the cataract, I have therefore thought it right to repreſent it in different views, by which any tradeſman accuſtomed to this kind of buſineſs will readily make one. I think it right to obſerve, too, that the public is indebted for any advantage to be reaped from this inſtrument to the late Mr Miller, who for ſeveral years practiſed with much reputation as an oculiſt in this place.

Some practitioners, ſenſible of the impoſſibility of fixing the eye properly in the manner commonly attempted with the fingers alone, and finding the common ſpeculum inſufficient, have propoſed another inſtrument for this purpoſe: It conſiſts of a ſharp ſpear or prong, fixed in a handle, with a croſs flat bar near the point, as is delineated in Plate XXXI. fig. 2.

This inſtrument has long been employed in ſome parts of the Continent: It is uſed by puſhing the point of it thro' the ſclerotic coat on the ſide of the eye oppoſite to where the needle is to be entered; and it is prevented from penetrating far, by the croſs-bar near the point. It is now to be ſecured by an aſſiſtant at one ſide of the patient; and the eye-lids being ſeparated by the ſurgeon himſelf, aſſiſted by the perſon behind who ſupports the head, the eye may in this manner be fixed in ſome degree, but never with ſo much eaſe and certainty as with the ſpeculum we have mentioned.

Needles of various forms and ſizes have been uſed in this operation; but the flat needle, fig. 1. Plate XXXII. anſwers the purpoſe better than any I have ever tried. It ought not to be broader than this, otherwiſe it makes too large a cut in the coats of the eye; and if it is narrower, it does not ſo readily carry the lens along with it.

The round needle, fig. 2. of the ſame Plate, has been much employed by many itinerants; but I have not found, upon trial, that it anſwers ſo well as the other. After piercing the cataract, it parts with it too eaſily; and beſides, it enters the coats of the eye with more difficulty, and it cannot be ſo eaſily moved when introduced as the other; which being broad in the cutting part of it near the point, it forms an opening in the tunica ſclerotica ſomewhat larger than the diameter of the reſt of the inſtrument, which admits of its being afterwards eaſily moved in every direction.

It has been objected to the flat needle, that by its breadth it is more apt than the round one to hurt the iris; but if the precaution we have mentioned of introducing it with its flat ſurface towards this membrane be attended to, there can never be any hazard of this. The flat part of the needle may indeed be made broader than is neceſſary, and this I believe is very commonly done; by which the opening made with it is larger than is requiſite; more irritation is thus excited; and when broad near the point, it does not ſo readily penetrate the lens as when made of a narrower form. The needle delineated in Plate XXXII. fig. 1. is in every reſpect of a proper ſize. Fig. 3. repreſents a needle with a ſmall degree of curvature, by which I have ſometimes thought that the cataract may be more eaſily depreſſed than with a ſtraight needle; but I have not yet uſed it ſo frequently as to be able to ſpeak deciſively concerning it. In piercing the eye with it the convex ſide of the curve muſt be towards the iris, as this membrane might probably be injured if it were introduced in any other manner.

In deſcribing the operation, we deſired that the needle might be entered at one ſide of the eye, by paſſing it through the ſclerotic coat at the diſtance of one-tenth of an inch from the iris. And we likewiſe obſerved, that it anſwers the purpoſe better by introducing it ſomewhat below the centre of the eye, than if entered, as is uſually done, in a line with the centre of the pupil. It ought not, however, to be far below this point. The twelfth part of an inch is fully ſufficient; for when the needle is introduced near the bottom of the eye, the cataract cannot be ſo eaſily depreſſed with it.

It has been alleged, that the operation may be performed, not only with more eaſe, but with more ſafety, by introducing the needle through the tranſparent cornea, and after paſſing it through the pupil, to puſh down the cataract with the point of it to the bottom of the eye. This propoſal, however, will never probably be admitted into general practice; for it is impoſſible in this manner to depreſs the lens ſo eaſily as when the needle is entered in the manner we have directed: And beſides, it can ſcarcely be done without injuring the iris; a circumſtance which, of itſelf, ought to be conſidered as a valid objection to it. We now proceed to conſider the operation of extracting the cataract.

§ 3. *Of* EXTRACTING *the* CATARACT.

THE operation of couching, or depreſſing the cataract, had been long practiſed, and was conſidered as the only means by which an opake cryſtalline could be removed, till the year 1737, when an eminent oculiſt of Paris, Mr Daviel, firſt propoſed and practiſed the method of removing it by extraction.

It is true, that ſeveral years previous to this period, Mr Petit propoſed to make an opening through the tranſparent cornea, for the purpoſe of removing the lens when it is forced into the anterior chamber of the eye, either by external violence, or when it is puſhed through the pupil in the operation of couching, an occurrence which has ſometimes happened: but, being conſidered as extremely hazardous, it was rarely practiſed; nor was it ever ſuppoſed to be proper in any other ſtate of the diſeaſe, till Mr Daviel, about the time we have mentioned, put it frequently in practice, in preference to the operation of couching. By ſome the merit of this operation has been attributed to our countryman Taylor, a famous itinerant of theſe times; but this will not be admitted by any who have paid attention to the hiſtory given of it by thoſe who had the beſt opportunities of becoming acquainted with it.

This operation conſiſts in an opening being made through the tranſparent cornea, of a ſufficient ſize for admitting the paſſage of the lens after it has paſſed thro' the pupil into the anterior chamber of the eye. The operation itſelf was nearly if not exactly the ſame when practiſed at firſt by Mr Daviel as it is at preſent; but the method of doing it was rendered more difficult and tedious by the uſe of a greater number of inſtruments than are now found to be neceſſary. At that period knives of different forms were uſed; as alſo, ſciſſars, forceps, a lancet concealed in a canula for opening the capſule of the cryſtalline, &c. In the preſent improved ſtate of this operation, the only inſtruments that are uſed are, a ſpeculum for fixing the eye, the knife fig. 1. Plate XXXIII. a ſmall ſcoop, fig. 4. and a flat blunt-crooked probe, Plate XXXV. fig. 5.

In proceeding to this operation, the patient muſt be placed in the ſame kind of light, and muſt be ſecured in the ſame manner as we have directed for the operation of couching. The ſurgeon muſt likewiſe be ſeated in the ſame manner before the patient, and ought to reſt his elbow either upon a table, or upon his knee raiſed to ſuch a height as to bring his hand nearly on a line with the pupil.

This being done, when the lens is to be extracted from the left eye, the ſpeculum muſt be applied in the manner we have formerly mentioned, and muſt be preſſed upon the eye with the left hand of the operator with as much firmneſs as is neceſſary for ſecuring the eye; but more than this ſhould be avoided, as it not only gives more pain, but is apt to preſs the cornea into too near contact with the iris; by which the latter is in great riſk of being

PLATE. XXXIII.

1.

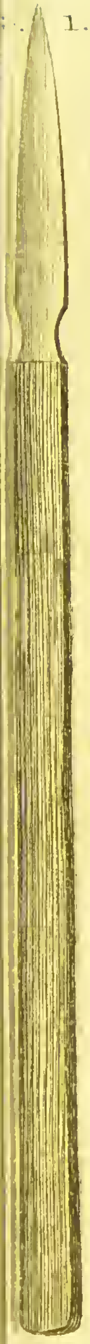


FIG. 2.

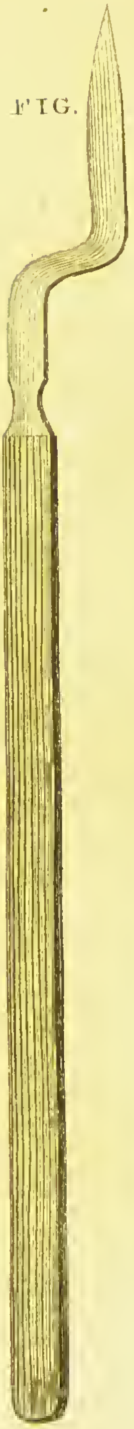


FIG. 3.

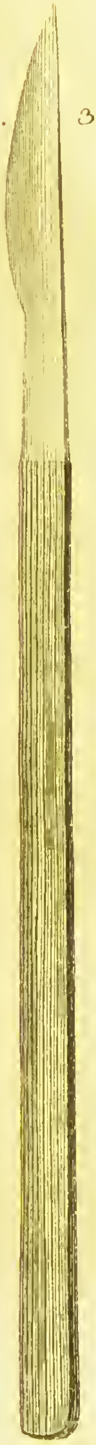
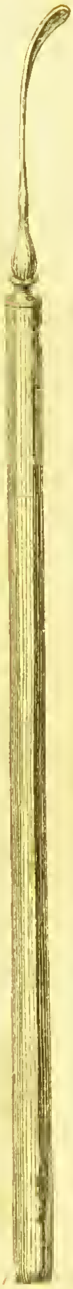


FIG. 4.



ing injured in the ſubſequent ſteps of the operation.

The ſurgeon is now to take the knife we have mentioned between the thumb and fore and middle fingers of his right hand, allowing nearly an inch to project paſt the extremity of his middle finger; and the point of it being brought in contact with the lucid cornea, it muſt be made to penetrate this coat at the diſtance of the ſixteenth part of an inch or thereby from the iris, in a line running from the external canthus of the eye directly acroſs the centre of the pupil, as is repreſented in Plate XXXIV. fig. 2.

The convex ſurface of the knife being ſtill kept next to the iris, it muſt be carried ſlowly forward in this ſituation, till the point of it reaches the other ſide of the eye directly oppoſite to where it entered; and muſt here be puſhed out till nearly a quarter of an inch of the inſtrument is freely through the cornea. The operator is now, in a gradual manner, to form a ſemilunar cut in the under part of the cornea, by moving the knife downwards in ſuch a manner, that all that portion of the cornea lying between the point at which it entered and that at which it paſſed out, may be divided at an equal diſtance from the iris; as is repreſented in Plate XXXIV. fig. 4. In this manner an opening will be formed ſufficiently large for the paſſage of the cataract.

While this ſemilunar cut is forming in the cornea, the preſſure of the ſpeculum upon the eye-ball ſhould be gradually leſſened, otherwiſe the vitreous humour is apt to be preſſed out on the inciſion being completed. We are adviſed indeed by ſome to remove the ſpeculum altogether on the knife being paſſed out at the oppoſite ſide of the eye; and for this purpoſe an opening is left on one ſide of the inſtrument, to admit of its being taken off, as is repreſented in figure 3. Plate XXX. But with an operator accuſtomed to the uſe of the ſpeculum, there is no neceſſity for this precaution; for a degree of preſſure may be continued with it ſufficient for fixing the eye, without any riſk of forcing out the vitreous humour; and by keeping the eye fixed to the laſt, we are enabled to form the inciſion with more exactneſs than can poſſibly be done when the ſpeculum is removed earlier in the operation. I have ſeen it indeed often done in this manner; but as ſoon as the eye has loſt the ſupport of the ſpeculum, the preſſure of the knife is apt to draw the eye-ball too far down towards the under edge of the ſocket, by which a ſmaller ſegment of a circle is commonly formed than is ſufficient for the paſſage of the lens; for by the eye being drawn ſuddenly downwards on the ſpeculum being removed, the under part of the inciſion is almoſt always formed at too great a diſtance from the iris, and is thus made ſmaller than it ought to be.

When the eye-ball has been too forcibly compreſſed by the ſpeculum, the cataract, together with all the aqueous, and a conſiderable portion of the vitreous humour, are very commonly preſſed ſuddenly out: but when this part of the operation is duly attended to, nothing eſcapes at the opening

ing in the cornea but the aqueous humour alone.

As ſoon as the incifion is completed, the operator muſt lay aſide the knife; and having lifted the flap formed in the cornea with the flat crooked probe, Plate XXXV. fig. 5. he muſt with much caution paſs the point of this inſtrument through the pupil, in order to ſcratch an opening in the capſule of the lens: and this being done, the cataract is eaſily forced out by a very equal though moderate preſſure applied with the ſpeculum over the globe of the eye.

It happens indeed in ſome inſtances, that a good deal of preſſure is neceſſary, in order to force the cataract out: but this is always owing to ſome fault in the previous ſteps of the operation, almoſt univerſally to the inciſion in the cornea being made ſmaller than it ought to be, by which the lens is with difficulty forced through the pupil; or if it is made to enter the anterior chamber of the eye, it does not paſs through the opening in the cornea ſo readily as it ought to do.

In this ſituation, it is the common practice, by repeated applications of preſſure, to force out the lens; and when much preſſure is employed, the vitreous humour is always found to accompany it. This, however, ought not to be imitated; for nothing proves more deſtructive to the eye than violence applied to it in this manner: for beſides the loſs of the vitreous humour, the iris is often materially hurt by it.

When the lens cannot be eaſily removed from the anterior chamber of the eye by means of a ſcoop, and in every inſtance where it is with difficulty forced through the pupil, the operator, inſtead of perſiſting to employ much preſſure, ſhould rather enlarge the opening in the cornea, uſing for this purpoſe a pair of ſmall probe-pointed ſciſſars; and this being done, the operation muſt be finiſhed in the manner we have already pointed out.

With a view to render the paſſage of the lens as eaſy as poſſible, the pupil ſhould at this part of the operation be in the ſtate of the moſt perfect dilatation; for which purpoſe, after the inciſion of the cornea and the opening of the capſule of the cryſtalline are completed, a dark cloth or curtain ſhould be placed between the eye and the light, to be removed on the lens paſſing out.

In a few inſtances of cataract, the cauſe of opacity is found to be, not in the lens itſelf, but in its capſule. When this is the caſe, extracting the cataract anſwers no good purpoſe, as the opacity remains equally ſtrong after as before the operation. Some authors have therefore adviſed our attempting, in ſuch circumſtances, to remove the opake capſule by forceps, and other inſtruments, paſſed through the pupil; but this can never be accompliſhed without much riſk of injuring the iris and other parts of the eye: ſo that more harm than good is moſt likely to be the conſequence of this practice. On this account, I would rather adviſe an operator to truſt to time and an antiphlogiſtic regimen,

PLATE. XXXIV.

FIG. 1.

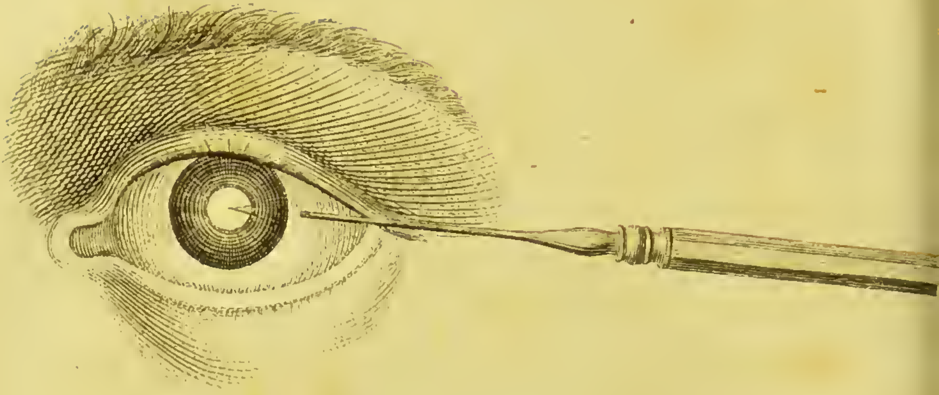


FIG. 2.

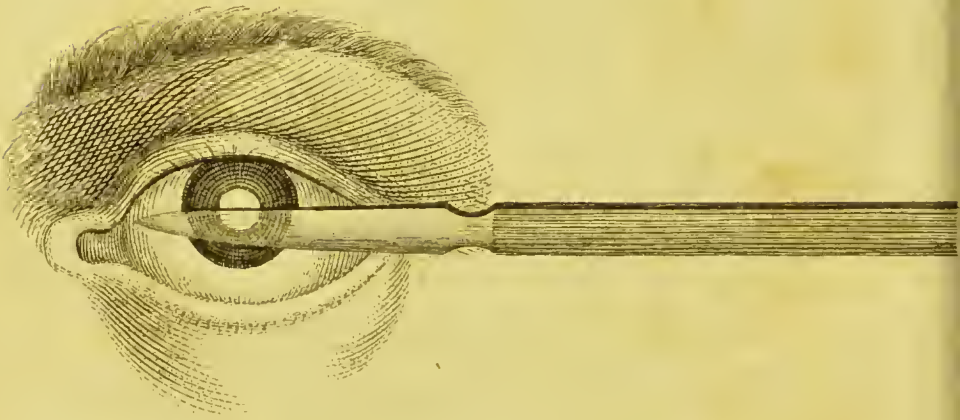


FIG. 3.

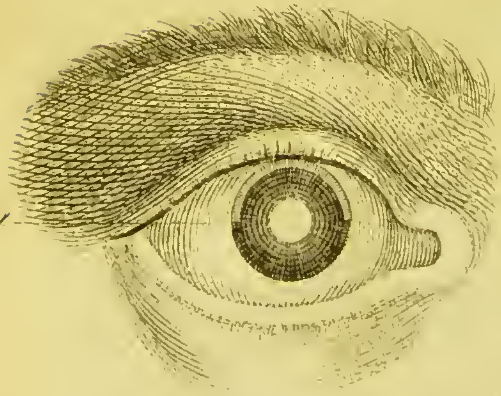
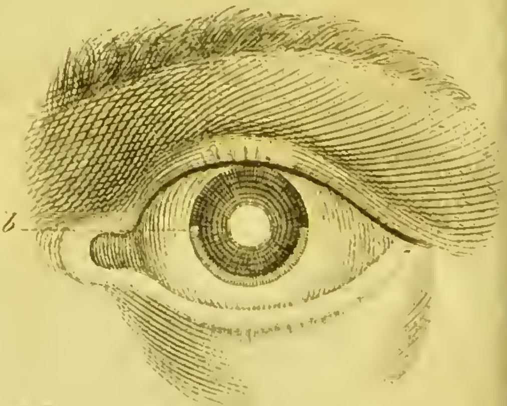


FIG. 4.



D. Lizars Sculpt

for the removal of the opacity. No miſchief can enſue from this; and I have known inſtances of cures being performed by it: whereas the contrary practice, ſo far as I have yet heard, has never in any caſe effected a cure; and it has frequently deſtroyed the iris entirely.

When, again, the operation is to be performed upon the right eye, if the ſurgeon wiſhes to do it in the uſual way with the knife commonly employed, he muſt uſe his left hand; but as few practitioners are able to perform this nice operation with the left hand with ſufficient ſteadineſs, I have delineated a knife, fig. 2. Plate XXXIII. by which it may be eaſily done with the right hand, while the patient and ſurgeon are ſitting oppoſite to each other in the manner we have directed: only, in this caſe, the point of the knife muſt be entered at the internal canthus of the eye, and muſt then be puſhed outwards to the oppoſite ſide, inſtead of being introduced at the external angle and carried towards the noſe.

The operation being finiſhed, the eye ſhould be immediately covered with a compreſs of ſoft lint, or of old linen, ſoaked in a ſaturnine ſolution, to be retained by a night-cap, or any other bandage that does not compreſs the head much, or keep it too warm. The ſame kind of management which we mentioned with reſpect to regimen after the operation of couching, muſt be ſtrictly attended to here. For ſeveral days after the operation, no light ſhould be admitted to the patient's apartment. A very low diet is abſolutely neceſſary: and the eye being very apt to inflame, repeated blood-lettings are frequently requiſite from the jugular vein or temporal artery.

As this operation indeed is more apt to fail by the ſubſequent inflammation upon the cornea than by any other circumſtance, it requires our utmoſt attention to guard againſt it: and as the healing of the inciſion depends in a great meaſure on the eye being kept at reſt, every cauſe of irritation ſhould be avoided.

ed. When the operation ſucceeds, the cure of the inciſion is in general completed in ten or fourteen days; but in ſome inſtances the cut continues open for ſeveral weeks.

In deſcribing the different ſteps of the operation, we mentioned a circumſtance which frequently happens when it is not done with ſufficient caution, and which commonly proves alarming; namely, the loſs of a conſiderable part, or perhaps of the whole, of the vitreous humour. By this the eye becomes flat, and inſtantly ſinks within the orbit: but although it ought to be guarded againſt with the niceſt attention, it does not always prevent the ſucceſs of the operation. I have known indeed ſome inſtances of the eye always remaining ſunk and uſeleſs after an accident of this kind; but moſt frequently the globe begins ſoon to fill again, and in the courſe of two or three weeks it has commonly acquired its uſual bulk.

Whether or not this takes place from a regeneration of the vitreous humour, or merely from the ball of the eye being all filled with an aqueous ſecretion, I will not pretend to ſay. The latter is the common opinion; but why may not the vitreous be renewed as readily as the aqueous hu-humour? I am inclined to think that a renewal of the one happens as readily as that of the other, from having often obſerved as perfect a ſtate of viſion after this operation where all the vitreous humour had been loſt, as where none of it was evacuated. A remarkable inſtance occurred of this in a woman who had the operation performed upon both eyes. The eyes were both apparently ſound in other reſpects: In one, the whole of the vitreous humour was forced out along with the cataract, and the eye ſunk entirely to the bottom of the orbit; in the other, the operation was performed with much accuracy; the cataract was extracted, and none of the vitreous humour eſcaped. In the courſe of three or four weeks, however, from the operation, both eyes were of the ſame bulk; their appearance was perfectly ſimilar; and the patient diſcovered objects equally well with each of them. This does not indeed determine the point with certainty, as it may be alleged, that the figure of the eye being preſerved by the aqueous humour, the effect produced upon viſion by the loſs of the vitreous humour cannot probably be great; but we can ſcarcely ſuppoſe that any part of ſuch an important organ has been formed in vain.

We ſhall now offer a few obſervations upon the inſtruments employed in this operation. Knives of various forms have been propoſed for it; but the two that are delineated in figures 1. & 3. Plate XXXIII. have been moſt generally uſed; and of theſe fig. 1. is by much the beſt. The ſhape is nearly that of a ſpear-pointed lancet; only the back of it is blunt, excepting a fourth part of an inch or thereby near the point, which ſhould be ſharp on both edges; and that ſide of the knife which paſſes next the iris ſhould be ſomewhat round, while the other is nearly or altogether flat. The intention of this is to prevent, as much as poſſible, any riſk of hurting the iris, which is very apt to happen with a knife that is flat on both ſides, and with both edges ſharp through the whole length. The operation has frequently indeed been performed with a knife of this kind; but it is found by experience that it may be done with more ſafety with one ſuch as we have mentioned. It muſt be remembered, however, that although a knife for this purpoſe ſhould be extremely ſharp and finely poliſhed, it ought likewiſe to be tolerably firm; for the cornea being of a conſiderable thickneſs, it is more difficult to penetrate than is commonly imagined by thoſe not accuſtomed to this operation, who are therefore diſappointed at finding the inſtrument in ordinary uſe too fine. It ought to be nearly of the ſame thickneſs with a common lancet.

The form of knife fig. 3. is much employed in different parts of the Continent; but it neither penetrates the cornea ſo eaſily, nor does it afterwards form the inciſion ſo ſmoothly and equally as the other.

For the purpoſe of opening the capſule of the lens, the flat curved probe we have mentioned anſwers extremely well, and may be uſed with more ſafety than any other inſtrument hitherto employed. As this membrane is very delicate, it is eaſily opened even with a blunt probe; and a ſharp-pointed inſtrument, ſuch as is commonly uſed, being more apt to wound the iris, it ought to be avoided: But whatever inſtrument is employed for this purpoſe, it ought to be paſſed through the pupil with much ſteadineſs, otherwiſe the iris may be readily injured whether it is ſharp or not.

I have thus deſcribed all the ſteps of the operation as it is now practiſed, with ſuch improvements as it appears to admit: But as it is an operation of much importance, and as it is liable to different objections even in its preſent improved ſtate, I have been led to conſider it with more than ordinary attention, and to make experiments upon different animals with a view to obviate theſe; the reſult of which I ſhall now ſhortly relate, although I did not think it proper either to place any weight upon them, or even to mention them in the deſcription of the operation; for till experience upon the human body has confirmed the propriety of it, no conjecture, however well founded it may appear to be from experiments upon other animals, ſhould be allowed to have much effect in directing us.

The moſt material objections which occur to this operation are theſe:—The vitreous humour is apt to paſs ſuddenly off along with the cataract; by which the eye is on ſome occaſions ſunk ſo much as never to recover its form again:—The inciſion being made in the tranſparent part of the eye, the cicatrix which enſues is frequently ſo extenſive as to obſtruct the rays of light in their paſſage to the retina; by which viſion is often as effectually obſcured, as if the cataract had not been extracted:—And laſtly, the lens being often too large for paſſing through the pupil, the iris is frequently much injured by this part of the operation, when in every other point it is perhaps very properly performed.

With reſpect to the firſt of theſe, it may be alleged, that it does not occur when the operation is properly performed; and that it cannot with propriety be ſtated as an objection to it, merely becauſe it frequently happens from aukwardneſs or inattention in the operator. This accident, however, is ſo frequent, that whatever can tend to prevent it muſt be conſidered as a very material improvement.

This, I think, may be in ſome meaſure effected, by the inciſion being made in a different part of the cornea. When the opening in the cornea, as in the uſual way of performing this operation, is made in the moſt depending part of it, all the aqueous humour is inſtantly diſcharged, and the vitreous humour by this means deprived of ſupport at its anterior ſurface, any preſſure made upon the ball of the eye by the ſpeculum, or even by the natural action of the muſcles of the eye, is therefore very apt to force it out. Inſtead of this, when the inciſion is made in the upper part of the cornea, the lens may be extracted with great eaſe, and a conſiderable part of the aqueous humour being ſtill retained by the inferior half of the cornea, the vitreous humour is neither ſo ſuddenly nor ſo entirely deprived of the ſupport which it affords, and does not eſcape ſo readily as in the ordinary method of performing the operation. At leaſt this is the caſe in other animals; and there is reaſon to imagine, that it will likewiſe take place when the operation is done on the human eye.

It is probable, too, that another advantage may be derived from the inciſion being made in the upper part of the cornea. One material objection to this operation, when done in the uſual way, ariſes from the cicatrix induced by the inciſion on the cornea. The ſame extent of the cornea will no doubt be cut when the operation is performed in the manner we have mentioned; but the cicatrix being in the upper part of the eye, it will not probably prove ſo hurtful, as it is of moſt importance for us to view objects lying beneath the eye diſtinctly. We frequently find that patients who have undergone this operation, ſee every object much more diſtinctly when placed above the eye, than when viewed beneath it; a circumſtance that cannot in any other manner be accounted for.

The upper part of the cornea is cut with the ſame eaſe as the under part of it; the ſame inſtruments being employed, and the ſurgeon, patient, and aſſiſtants, being placed in the ſame manner! Only in this caſe, the knife muſt be introduced with the cutting edge of it towards the upper part of the eye, the inciſion being to be extended in this direction: And as the under half of the cornea remains undivided, the lens, on paſſing through the pupil, being apt to be retained by it, it muſt be cautiouſly removed, either with the ſcoop, with a ſmall ſharp hook, fig. 2. Plate XXXV. or with the ſmall forceps, fig. 4. which were made for this purpoſe when I was engaged in the experiments mentioned above.

In this manner the two firſt objections to this operation may be in ſome meaſure obviated; and from all the obſervation I was able to make of it in the courſe of the experiments I have alluded to, I think it probable that it will anſwer in every reſpect better than any other that has yet been propoſed; but as I have never put it in practice in the human eye, I cannot ſpeak deciſively about it. It is therefore only propoſed as a hint for future obſervation.

But although we may by this means prevent the vitreous humour from eſcaping, and may avoid the bad effects which uſually reſult from the cicatrix which remains after this operation, yet the third objection remains in equal force againſt it; the cataract muſt neceſſarily paſs through the pupil, and in doing ſo the iris is often irreparably injured.

As this renders the operation much more hazardous than it otherwiſe would be, it has always appeared to me that it would be an object of the firſt importance to extract the cataract in any other manner that would not expoſe the iris to this hazard. This may be done by forming the opening behind this membrane, inſtead of making it in the uſual place in the lucid cornea; and it would likewiſe be attended with this advantage, that no inconvenience would enſue from the cicatrix. I have performed the operation in this way on other animals, but it has never, I imagine, been put in practice on the human eye. The objections which occur to it are, that the opening being made in the ſclerotica, the inflammation induced by it muſt probably be great; and this coat of the eye being of a thicker ſubſtance than the tranſparent cornea, wounds made in it are commonly ſuppoſed to be more difficult to heal. In ſome experiments, however, which I made upon rabbits with a view to determine this point, no reaſon appeared for this concluſion. The inflammation induced by an opening made in the ſclerotica was not more conſiderable; nor was the cure in any reſpect more difficult than when the operation was done in the uſual manner.

If the operation is ever performed in this manner, the opening ſhould be made in the upper part of the eye, by entering the point of the knife about the tenth part of an inch or thereby behind the tranſparent cornea; and the inciſion being made of a ſufficient ſize for allowing the cataract to paſs, the ſharp-curved probe, fig. 2. Plate XXXV. ſhould be introduced, for the purpoſe of extracting it. As the point of the inſtrument is extremely ſharp and fine, it penetrates the lens with eaſe; and in this manner it may be removed without any preſſure being made upon the eye.

Having thus finiſhed the conſideration of the two operations of couching and of extracting the cataract, before concluding the ſubject I ſhall offer a few obſervations upon the comparative advantages attending them; and ſhall at the ſame time mention thoſe reaſons by which I have been induced to prefer the one to the other.

PLATE. XXXV.

FIG. 1.

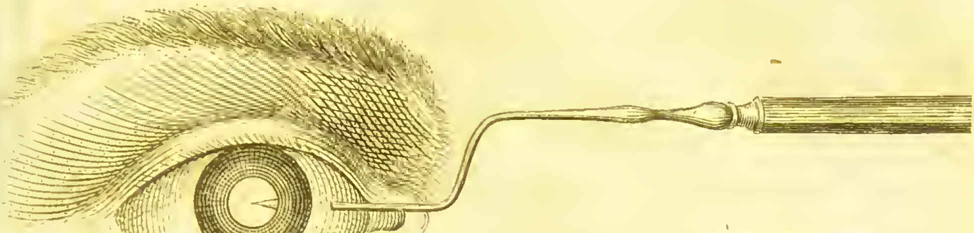


FIG. 2.

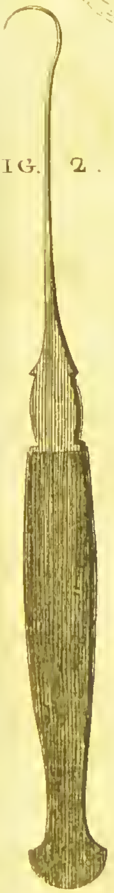


FIG. 3.

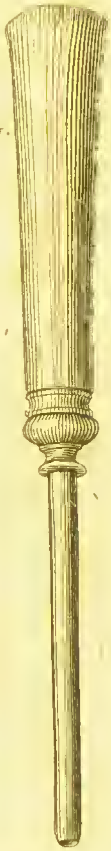


FIG. 4.

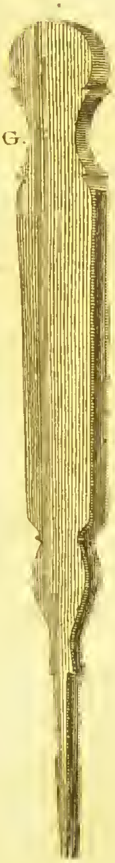


FIG. 5.

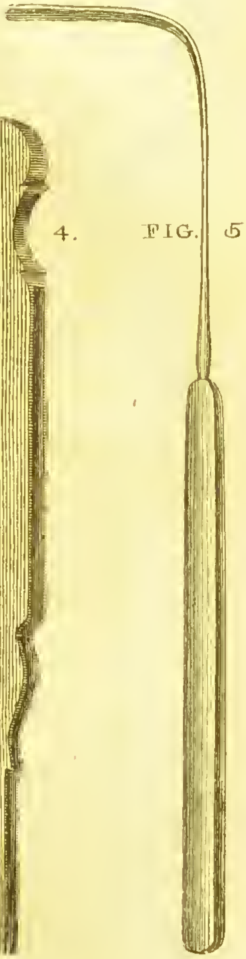
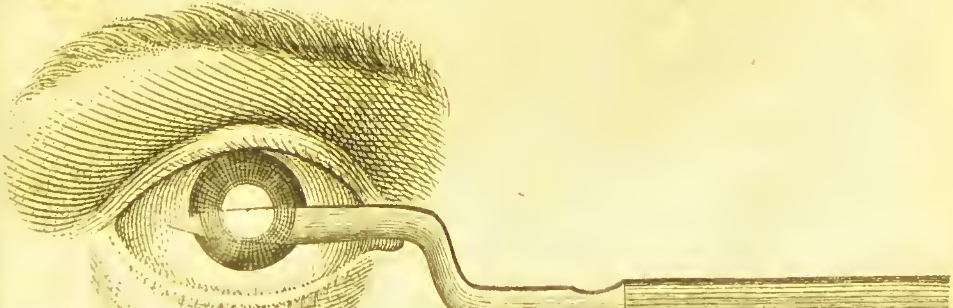


FIG. 6.



D. Lizars Sculp^t

§ 4. *Comparative View of the reſpective Advantages and Diſadvantages of the Operations of Couching, and of extracting the Cataract.*

THE operation of couching, or depreſſing the lens, was the firſt that was practiſed for the cure of the cataract. The extraction of the lens was afterwards propoſed, as a more certain means of removing the diſeaſe. Both methods have had their abettors, and much has been ſaid in favour of each. To appreciate, therefore, the merits of theſe operations, and to aſcertain that by which our intention may be accompliſhed in the ſafeſt and eaſieſt manner, are objects which deſerve our attention.

It has been objected to the operation of couching, 1. That it frequently fails from the cataract riſing again into its uſual ſituation. 2. That it muſt always fail when the lens is in a ſoft or liquid ſtate, by the fluid contained in the capſule diſperſing through the eye when the capſule is opened by the couching needle. And, laſtly, When the opacity lies in the capſule, and not in the lens, that it cannot be cured by couching.

With regard to the firſt of theſe, it muſt be acknowledged, that the lens frequently riſes again after having been depreſſed to the bottom of the eye: But when the lens, inſtead of being puſhed down immediately behind the pupil, is carried, as we have directed, by the point of the needle towards one angle of the eye, and lodged partly beneath the vitreous humour, it will ſeldom riſe again. And even where the operation fails through the fault of the ſurgeon, or from any other cauſe, the pain attending it is ſo inconſiderable, that few patients will refuſe to ſubmit to a repetition of it once or oftener; and I have never known an inſtance of its proving ineffectual where this has been agreed to.

The ſecond objection may appear of more importance to thoſe who are not much accuſtomed to operations on the eye, but it is not ſo in reality. A cataract in a fluid ſtate, and flowing out from the capſule immediately on its being pierced with the needle, is not a common occurrence; from my own obſervation I would ſay, that it does not happen in above one of twenty caſes: But were we even to meet with this circumſtance more frequently, ſo far from ſtating it as an objection to the operation, we would have reaſon to conſider it as an advantage. In this caſe the violence done to the eye is not ſo great as when the operation of couching is neceſſary in all its parts, from the cataract being of a firm conſiſtence; a repetition of the operation can never be requiſite, and the milky whiteneſs communicated to the aqueous humour, by the diſperſion of the liquid cryſtalline through it, commonly diſappears in a ſhort time after the operation. At leaſt that it does ſo is conſiſtent with my experience; and the obſervation is confirmed by the teſtimony of others, particularly of Mr Pott, on whoſe authority we may rely with confidence.

Nay farther, even when the cataract is

firm and entire, if it be completely ſeparated from its capſule by the couching-needle, it almoſt always diſſolves in the aqueous humour, without leaving any veſtige of opacity; an obſervation much in favour of the operation of couching, as it obviates the objection which is founded on the riſing of the cataract after it has been depreſſed: At the ſame time it ſhows, that there is little or perhaps no reaſon for ever putting in practice the propoſal of Mr Petit for removing a cataract which in couching may have been accidentally puſhed into the anterior chamber of the eye, as time will, in moſt inſtances, accompliſh without pain or hazard what cannot be done by Mr Petit's method but at the expence of both.

The lens will diſſolve in the aqueous humour ſooner or later, according to the firmneſs of it at the time of being ſeparated from its capſule. The opacity produced by the diſperſion of a fluid lens in the aqueous humour, commonly diſappears in a few days after the operation: Cataracts of a firmer conſiſtence are ſeldom altogether diſſolved in leſs than ſeveral weeks; and in a few inſtances a ſmall portion of a depreſſed cataract has been obſerved in an undiſſolved ſtate a good many months after the operation; but this is a rare occurrence.

The third objection we mentioned, the alleged impoſſibility of removing the diſeaſe by couching, when the cauſe of the opacity lies in the capſule and not in the lens, ſeems á priori to be the moſt concluſive againſt this operation; but it will not on examination be found to be ſo. In the firſt place, this ſpecies of cataract is a very rare occurrence. It is met with in a few inſtances, but by no means ſo frequently as to induce us to prefer one mode of operating to another for this reaſon alone.

Secondly, We have already obſerved that this ſpecies of the diſeaſe cannot be cured even by extraction. The opake capſule may indeed be forcibly tore away by inſtruments paſſed through the pupil, but not without ſuch violence being done to the eye as muſt be productive of certain blindneſs. We can therefore, without heſitation, venture to predict, that although this operation may be performed from time to time by thoſe who are fond of innovation, and who wiſh to ſhow their dexterity at the expence of thoſe intruſted to them, it will not however be received into general practice.

Farther, although we will not ſay that this ſpecies of the diſeaſe can in every inſtance be removed by couching, yet an attempt towards it may be made with perfect ſafety, by endeavouring to ſeparate and depreſs the capſule with the point of the needle. If this can be done, the operation will prove as ſucceſsful as if no ſuch cauſe of diſeaſe had ſubſiſted: And when it happens to fail, provided the trial is made with ſufficient caution, no detriment will enſue from it.

Beſides theſe, it has been ſaid, in oppoſition to the operation of couching, that the pain and inflammation attending it are frequently greater than what are occaſioned by extraction; and that the vitreous humour is more apt to be deranged by the needle in couching, than by the other method of operating.

But neither of theſe aſſertions will be admitted by thoſe who have had ſufficient opportunities of putting both operations in practice. They know, that in general the pain and inflammation attending the extraction of the cataract are much more conſiderable than thoſe which proceed from couching: And it will be acknowledged by all who ſpeak impartially upon this ſubject, that the operation of extraction is more frequently attended with the loſs of ſome part, or perhaps of the whole of the vitreous humour, than that of couching, with any material derangement of it.

We have thus ſeen that the ſeveral objections ſtated to the operation of couching, are not well founded:—That the cataract can be removed by it as effectually as by the operation of extraction:—That it is attended with leſs pain, and leſs ſubſequent inflammation; while at the ſame time it never can occaſion thoſe deformities which ariſe from a large cicatrix on the cornea, or from the ſinking of the eye-ball, which ſometimes occurs from the loſs of the vitreous humour.

But theſe circumſtances alone ſhould not be allowed to decide a queſtion of ſuch importance: The ultimate and permanent effects of the two operations ought to have much weight in determining our opinion. Now, from much obſervation, it appears clearly to me, that the operation of couching proves upon the whole more ſucceſsful than the other; that is, viſion is as perfectly reſtored by couching, and, cæteris paribus, a greater proportion of thoſe who ſubmit to it receive benefit from it, than of thoſe who undergo the operation of extraction.

With thoſe who have not had frequent opportunities of obſerving the conſequences of extraction, it proves always a very deceiving operation. The removal of the cataract is in general attended with an immediate return of viſion, much to the ſatisfaction both of the patient and operator: But in a great proportion of caſes, even of thoſe which at firſt have every appearance of proving ſucceſsful, although viſion may be tolerably perfect for ſome time, perhaps for ſeveral weeks, or even for months; yet it generally grows more indiſtinct, till at laſt the patients become altogether blind. This is the reſult of my obſervation; and it correſponds with the event of the operation when performed by various good operators.]

The late Dr Young of this place, who practiſed ſurgery for a conſiderable time with much reputation, had at one period a very high opinion of this operation. In the ſecond volume of the Edinburgh Phyſical Eſſays, he gave an account of his ſucceſs in ſix caſes in which he had operated a few months before, and which at the time of writing the paper appeared to be remarkably great: but in a converſation with the Doctor on this ſubject a good many years afterwards, I found his opinion much changed. The Doctor's obſervations on the conſequences of extraction were exactly ſimilar to thoſe which I had made upon it. In the greater number of patients upon whom he had operated, viſion was reſtored immediately on the removal of the cataract; but in nearly the whole of them the ſight began to be impaired in a few months from the operation, and became gradually worſe, till total blindneſs was at laſt produced.

The progreſs of the loſs of that viſion which is reſtored by the extraction of the cataract, is marked by the following appearances. Some degree of immobility is at firſt obſerved in the pupil:—It remains inactive when the eye is expoſed to light:—It gradually becomes ſmaller; and at laſt is found to be ſo much contracted, as ſcarcely to appear capable of admitting a crow's quill:—It now remains immoveable in whatever light it may be expoſed to; and the patient is often reduced to a worſe ſtate than he was in before the operation,

ration, being even incapable of diſtinguiſhing light from darkneſs.

This unfavourable event appears to proceed from the violence which, in the courſe of the operation, is done to the iris. This we know is a membrane of the moſt delicate texture; and as the pupil through which the cataract is forced, is not nearly large enough for admitting the lens to paſs with eaſe, this can ſeldom be accompliſhed but with great hazard of injuring this very nice and uſeful part of the eye.

It may be ſaid, that the violence thus done to the iris ſhould produce an immediate effect; and that viſion, if not hurt by it at firſt, ſhould not afterwards be affected. In various caſes, the iris is torn in different places, and appears to be irregular in its contraction and dilatation from the time of the operation being performed: but although in theſe, as well as in other inſtances where the pupil is only overſtretched, blindneſs does not take place immediately; yet it is almoſt as certainly to follow as if it had been inſtantly produced. The reaſon of its not occurring immediately after the operation may be difficult or perhaps impoſſible to explain: but the fact is exactly as we have mentioned; and by impartial obſervers will be acknowledged to be ſo.

Proceeding upon the idea that the failure of this operation depends in a great meaſure upon the injury done to the iris by the paſſage of the cataract, and being anxious to improve an operation for which at one time I had a great partiality, I have offered a propoſal for this purpoſe.——By making the opening in the eye behind the iris, this inconvenience may be avoided; but whether or not this mode of operating will be found to ſucceed, future experience muſt determine.

In the mean time, till the operation of extraction is ſo far improved as to obviate the bad effects we have pointed out, the means of cure by depreſſing the cataract ſhould certainly be preferred, as being more eaſily performed; leſs apt to injure the other parts of the eye; and as being attended with more real advantage.

SECTION XVIII.

Of the FISTULA LACHRYMALIS.

IN Surgery, a ſinuous ulcer, with hard or callous edges, is in general termed a Fiſtula; but authors, in treating of diſeaſes of the lachrymal paſſages, have affixed a different meaning to this term: Every obſtruction to the paſſage of the tears from the eye to the noſe, is commonly, though improperly, denominated a Fiſtula Lachrymalis. A ſinus of theſe parts, attended with calloſity, ought alone to receive this appellation; but as ſome confuſion might occur from any innovation that could be propoſed, I ſhall avoid, as I have hitherto done, any attempt of this nature; and ſhall endeavour to deſcribe, as clearly as poſſible, the various appearances with which the diſeaſe is attended, under the general denomination of Fiſtula Lachrymalis.

We have already given an anatomical deſcription of the eye in the ſecond ſection of this chapter; and muſt now refer to what was then ſaid of the parts concerned in the diſeaſe of which we are now to treat. An accurate delineation is likewiſe given of theſe parts in Plate XXXI. fig. 1. *b* repreſents the puncta of the two lachrymal ducts, by which the tears are carried from the eye into the ſac *e;* from whence they are tranſmitted by a canal which paſſes in an oblique direction thro' the os unguis into the noſe, where it terminates below the os ſpongioſum inferius. We formerly remarked, that the os unguis is divided longitudinally by a kind of ridge, which at this part forms the boundary of the orbit; the groove in this bone, through which the naſal duct of the lachrymal ſac runs, lies altogether exterior to the orbit, being ſeparated from it by the ridge we have juſt mentioned.

This ſhort recapitulation of the anatomy of the lachrymal paſſages, will render the deſcription we are to give of the diſeaſes to which they are liable more intelligible.

The fiſtula lachrymalis ariſes, as we have already obſerved, from obſtruction to the paſſage of the tears into the noſe; but the diſeaſe aſſumes a variety of appearances, according to the ſeat of the obſtruction, and to the effects produced by it upon the neighbouring parts. Thus we may readily ſuppoſe, that the ſymptoms produced by the puncta lachrymalia, or by the ducts leading from theſe to the ſac, being obſtructed, will be very different from thoſe which occur from obſtruction formed in the lachrymal ſac itſelf, or in the duct leading from this ſac to the noſe. And again, we might, à priori, conclude, that the appearances induced by a recent obſtruction of any of theſe parts, muſt probably be very different from thoſe which occur from a long continuation of the diſeaſe.

The lachrymal puncta, and ducts connected with them, are ſometimes obſtructed in conſequence of burns, wounds, or ſe-

ſevere inflammatory affections; ſo that the tears being thus prevented from paſſing into the noſe, they neceſſarily fall over the cheek: and where they do not become acrid, ſo as to excoriate or fret the neighbouring parts, this diſcharge of tears is almoſt the only ſymptom with which this variety of the diſeaſe is attended: a dryneſs is indeed experienced in the correſponding noſtril, by the want of a ſecretion which uſed to be poured into it; but this inconvenience is never of much importance.

It is this variety of the diſeaſe only which ought to be termed Epiphora, or a watery or weeping eye; for when the obſtruction is ſeated in any other part of the lachrymal paſſages, the diſorder which enſues is attended with ſymptoms of a more painful and more perplexing nature.

When the lachrymal puncta and ducts remain open, if obſtruction takes place either in the under part of the lachrymal ſac or in the duct leading from it to the noſe, the firſt warning which the patient receives of it is a ſmall tumefaction forming in the internal canthus of the eye, which diſappears upon preſſure being applied to it, by a plentiful flow of tears paſſing into the eye, and from thence over the cheek. In this incipient ſtate of the diſorder, ſome portion of the tears frequently paſs into the noſe on the ſac being preſſed in the manner we have mentioned; a circumſtance which we conſider as favourable, as it ſhows that the obſtruction is not altogether complete.

If the tears are regularly preſſed out before the tumour acquires any great ſize, and before they have remained collected in the ſac ſo long as to become acrid, they are in general found to be perfectly clear, and in every reſpect of a natural appearance when forced out from the puncta. From the reſemblance of this fluid to the contents of hydropic collections in other parts of the body, this ſtage of the diſeaſe has been termed a Dropſy of the Lachrymal Sac; a diſtinction, however, of no real importance.

When in this ſtate of the diſorder the patient is attentive to a proper and frequent application of preſſure, and does not allow the lachrymal ſac to be over-diſtended, a complete cure is frequently obtained, or the diſeaſe is prevented from giving much uneaſineſs; at leaſt this is uniformly the caſe, ſo long as the tears retain their natural appearance, and while a conſiderable proportion of the contents of the tumour can be preſſed into the noſe.

It happens moſt frequently, however, either from inattention in the patient admitting of the ſac being over-ſtretched, or from ſome other cauſe, that this moſt ſimple ſtate of the diſorder proceeds in a gradual manner to turn worſe:—The paſſage into the noſe becomes completely obſtructed:—The ſwelling in the corner of the eye increaſes, but ſtill retains the natural appearance of the ſkin:—The tears are now preſſed out with more difficulty; and they are obſerved not to be tranſparent, but mixed with a proportion of a thick, opake, white mucus, ſomewhat ſimilar to, but when minutely attended to found to differ conſiderably from, purulent matter.

Even in this ſtage of the diſeaſe the patient ſeldom ſuffers much pain, or any farther inconvenience than what proceeds from the flowing of the tears and mucus over the cheek: at laſt, however, the tumour begins to inflame, to become tenſe, red, and painful to the touch; and the matter preſſed out from it has now a greater appearance of purulency.

At this period the tumour has exactly the appearance of a common boil or abſceſs; and by thoſe not verſant in this branch of practice, it is frequently conſidered as ſuch. It becomes gradually more inflamed and more tenſe, till the teguments at laſt burſt, and form an opening in the moſt prominent part of the tumour, at which the tears and matter contained in it are now altogether diſcharged.

When the opening thus formed is ſmall, it commonly heals again in the courſe of a few days; but it burſts as ſoon as any conſiderable quantity of tears and mucus is collected; and it continues thus to collect and to burſt alternately, till the opening becomes ſufficiently large to prevent any farther collection. This ſtate of the diſorder exhibits exactly the appearances of a ſinuous ulcer, with callous, and ſometimes with retorted, edges; and it is in this ſtage very properly termed the Fiſtula Lachrymalis. Tears, mucus, and purulent matter, are now abundantly diſcharged from the ſore. When the bone beneath is ſound, this diſcharge is ſeldom either acrid or offenſive to the ſmell; for the opening being in general in the under part of the tumour, the matter is evacuated almoſt as ſpeedily as it is formed; but when any of the contiguous bones are carious, they are not only found to be ſo by the introduction of a probe, but by the appearance, ſmell, and effects of the matter upon the neighbouring parts. In this caſe, it is thin, fetid, and commonly ſo acrid as to fret and corrode the teguments moſt contiguous to the ulcer: and when the diſorder is connected with ſcrophula or with lues venerea, an occurrence by no means unfrequent, the diſcharge and appearance of the ſore will be different according as it happens to be combined with one or other of theſe diſeaſes.

We have thus deſcribed the different ſymptoms of this affection, and the progreſs which it uſually makes from the firſt formation of obſtruction in any of the lachrymal paſſages, to the more advanced ſtages of the diſeaſe; and it is extremely neceſſary that practitioners be acquainted with the different appearances which the various ſtates of it afford; for the method of cure beſt ſuited to one period of the diſeaſe, is frequently unfit for, and indeed altogether inadmiſſible in others.

From the hiſtory we have given of the riſe and progreſs of the diſorder, it is evident, that in every inſtance it originates from obſtruction formed in ſome part of the lachrymal paſſages: The cure muſt therefore depend upon the removal of this obſtruction; but the means of effecting this will vary according to the nature of the cauſe by which it is produced, and to the particular ſtage of the affection: Our prognoſis, too, muſt likewiſe be directed by attention to theſe circumſtances; for we may readily conclude, that a cure will be more eaſily and more certainly accompliſhed in the caſe of a recent obſtruction, where the bones are yet perfectly ſound, and where there is no ſuſpicion either of ſcrophula or of lues venerea, than in circumſtances of an oppoſite nature. When obſtructions of this kind are induced by the venereal diſeaſe or by ſcrophula, and eſpecially when the os unguis and other contiguous bones have become carious, nothing will effect a cure till the general taint of the conſtitution is removed; and even then we can never be certain of preventing a weeping eye or a frequent flow of tears over the cheek: but when the fiſtula lachrymalis ariſes, as it moſt frequently does, from inflammation of the lachrymal paſſages, induced either by cold, by the meaſles, or any inflammatory affection to which the eyes are liable, if it has not continued ſo long as to hurt the bones beneath, we may in general give a favourable prognoſis: for in ſuch circumſtances, a due perſeverance in the means we ſhall afterwards point out is very commonly attended with an entire removal of the diſorder.

Again, when obſtructions are induced in the lachrymal canals by tumours in the contiguous parts, which they ſometimes are, particularly in caſes of polypi in the noſe, where the tumour by preſſing upon the inferior extremity of the naſal duct is apt to produce a ſtoppage to the flow of tears, the prognoſis muſt depend entirely on the practicability of removing the ſwelling by which the diſeaſe is induced; for till this is accompliſhed, nothing effectual can be done in the treatment of the fiſtula lachrymalis.

The lachrymal ſac and ducts are lined with a mucous membrane, ſimilar to the membrane which lines the noſe, with which it is connected, and of which indeed it appears to be a continuation. In a healthy ſtate of theſe parts, the naſal duct of the lachrymal ſac will eaſily admit a crow's quill; a ſize perfectly ſufficient for allowing a free paſſage of the tears into the noſe: But when the membrane which lines the duct becomes inflamed, as the fulneſs or ſwelling thus produced muſt diminiſh the diameter of the canal, obſtruction will neceſſarily occur in it in a degree proportioned to the violence of the inflammation. We have particularly mentioned the naſal duct; for it is in this duct which the obſtruction producing the moſt frequent variety of the diſeaſe is always ſeated, owing to its near contiguity to the noſe; from whence, in caſes of violent catarrh, inflammation is frequently communicated to it: but obſtruction to the flow of tears into the noſe will juſt as certainly occur from inflammation ſeated in the ducts leading from the eye to the lachrymal ſac; and the principles upon which the method of cure proceeds muſt be nearly the ſame in each of them.

When the diſorder originates from inflammation, our remedies ought to be exactly ſuch as are found to prove moſt effectual in inflammatory affections of other parts of the body. General and local blood-letting ſhould be preſcribed in quantities proportioned to the ſtrength of the patient, together with laxatives and a low diet; and a ſaturnine ſolution ſhould be applied to the part affected, either in the form of a poultice, or upon compreſſes of ſoft old linen. When means of this kind are timeouſly employed and duly perſiſted in, obſtructions which proceed from this cauſe will very frequently be removed; but when the parts have been allowed to remain long in an inflamed ſtate before any remedies are uſed, it often happens that a cure cannot afterwards be accompliſhed even by the moſt complete removal of the inflammation: For as inflamed parts, when kept long in contact, are every where apt to adhere; ſo the ſides of the lachrymal paſſages, when much inflamed, very readily unite together; by which a very obſtinate variety of the diſeaſe is neceſſarily produced; and which ſhows, in a ſtrong point of view, the propriety of treating every affection of this nature with the greateſt attention from the beginning; for by doing ſo, we frequently have it in our power to prevent this obſtinate kind of obſtruction, which nothing but a very painful operation will afterwards remove.

When the obſtruction is ſeated in the puncta lachrymalia, or in the ducts leading from theſe to the ſac, and when it is found to continue after the inflammation which gave riſe to it is removed, we are to endeavour to remove it by inſerting a ſmall probe into each punctum, ſo as to paſs it along the courſe of the ducts into the lachrymal ſac. In this manner the openings may be rendered pervious; and may be afterwards preſerved by injecting, twice or thrice daily with a ſmall ſyringe, a weak ſolution of alum or of ſaccharum ſaturni; and by keeping at other times ſmall lead-probes conſtantly inſerted, till the ſides of the ducts are rendered perfectly callous; when the tears finding a free

PL. XXXVI.

FIG. 1.

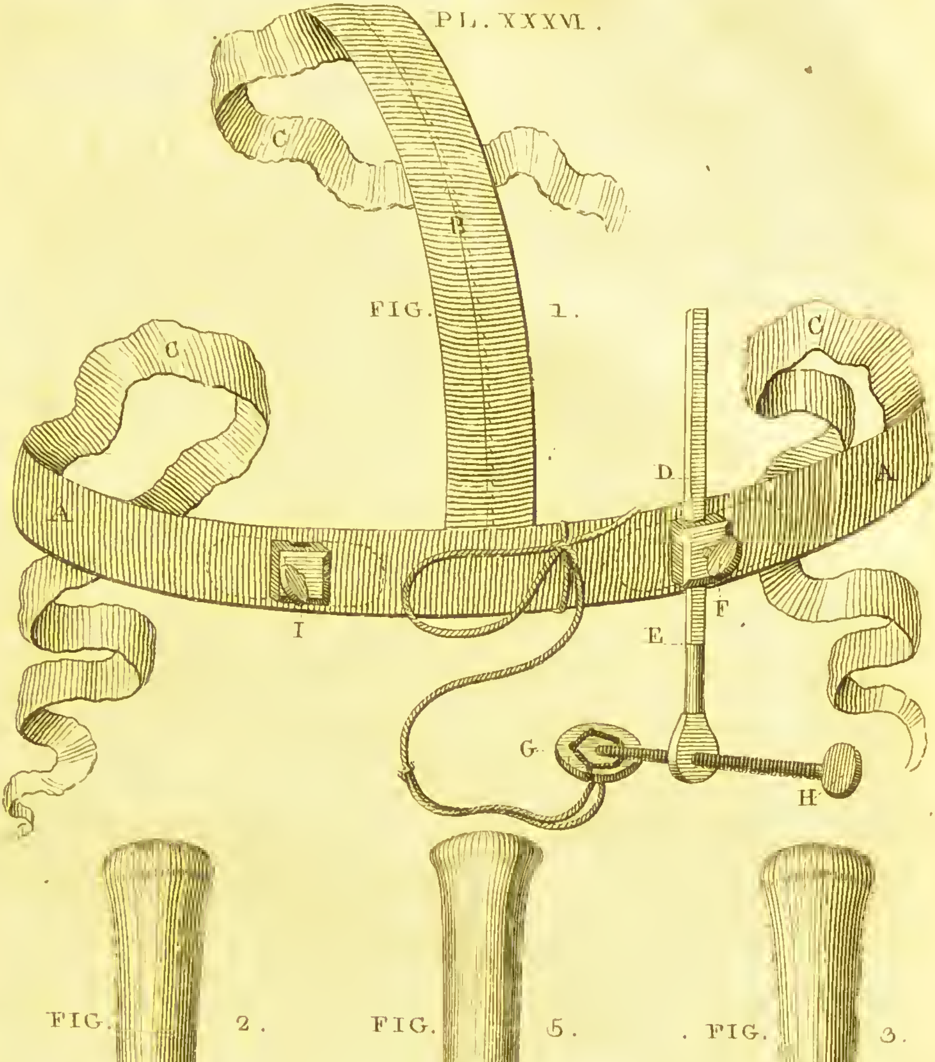


FIG. 2.

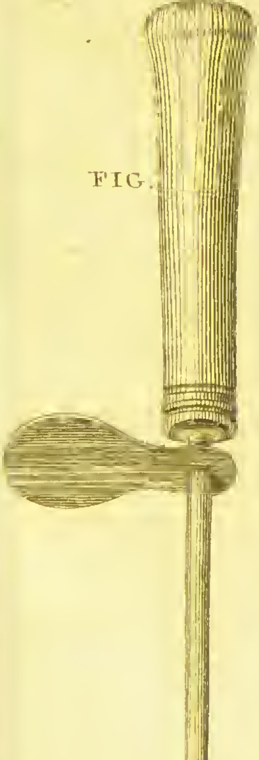


FIG. 5.

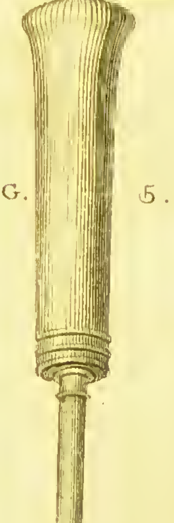


FIG. 3.

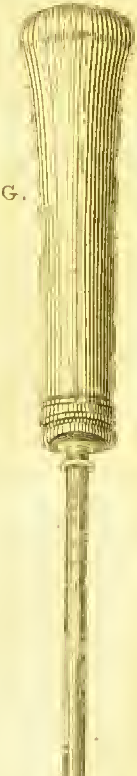
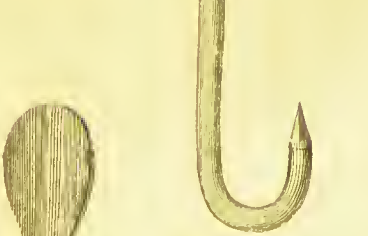


FIG. 4.



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paſſage into the ſac, a cure will thus be accompliſhed.

This, we muſt acknowledge, is a very nice operation: but whoever is verſant in the anatomy of theſe parts, and is acquainted with the exact courſe of the lachrymal ducts, will find no great difficulty in effecting it. The probes repreſented in Plate XXXVIII. figs. 5. and 6. and the ſyringe and ſmall tubes in Plate XXXVII. figs. 1. 5. and 7. are the inſtruments to be employed for it.

In obſtructions of theſe ducts, it has been likewiſe propoſed to paſs a ſmall ſeton from the puncta through the lachrymal ſac into the noſe, and to allow it to remain till the paſſage becomes ſufficiently callous. But, beſides the difficulty of effecting this, it is highly probable that it would do more harm than good, as the ſmalleſt cord that could be introduced would create a great deal of pain and inflammation.

The obſtruction, however, is moſt generally ſeated in the duct leading from the ſac to the noſe, forming a variety of the diſeaſe which requires a more complex me-

method of treatment. When it occurs from inflammation, an antiphlogiſtic courſe, ſuch as we have recommended, will frequently remove it; but when it happens to fail, either by the diſeaſe having been improperly treated from the firſt, or from any other cauſe, other means muſt then be employed. We ſhall therefore ſuppoſe, that any ſymptoms of inflammation which occurred are removed; that the naſal duct, however, ſtill remains obſtructed, and that it is attended with a ſlight tumefaction in the internal canthus of the eye, along with a frequent flow or diſcharge of tears over the cheek, the ſkin covering the ſwelling ſtill retaining its natural appearance.

This is the moſt ſimple ſtage of the diſorder: It is neither attended with pain, nor with any material deformity or inconvenience; and by a little attention patients frequently prevent it from rendering the aſſiſtance of ſurgery neceſſary. By often preſſing the lachrymal ſac with the finger, the contents of it are diſcharged before they become acrid; and although this will not accompliſh a cure, it will in general render the diſeaſe very ſupportable; and in this ſtage of it, ſo far as I can determine from my own obſervation, nothing farther ought to be attempted. We find indeed, in books, various means recommended for the purpoſe of effecting a complete cure; but as they are all tedious and painful, and eſpecially as they are by no means certain, as long as no farther inconvenience is experienced from the diſorder than a watery or weeping eye, a prudent practitioner will rather adviſe a patient to ſubmit to this, than undergo the pain, confinement, and uncertainty, of an operation. As a freſh attack of inflammation would be apt to render the diſeaſe worſe, he will adviſe him to avoid expoſure to cold; and whatever can have any effect in inducing an inflamed ſtate of the eye and neighbouring parts; and in the mean time he will deſire him to truſt to gentle preſſure alone for obviating any effects which may occur from the obſtruction.

For the purpoſe of applying preſſure in caſes of this nature, various machines have been invented; the moſt convenient form of which is repreſented in Plate XXXVI. fig. 1. by which any degree of compreſſion that is thought proper may be continued without interruption, and with little inconvenience. But, as we are now ſuppoſing that the naſal duct of the lachrymal ſac is completely obſtructed, and that no part of the tears can be forced into the noſe, no benefit can be derived from a continued courſe of preſſure; and as any advantage to be obtained from the practice is found to accrue with equal certainty from the finger being from time to time applied upon the courſe of the ſac, I have always, in this ſtage of the diſorder, been accuſtomed to depend upon this alone.

The other means which have been recommended for the cure of this ſtage of the diſeaſe, are, the introduction of a probe into the naſal duct of the lachrymal ſac, with a view to force open the obſtruction:—The injecting of water or any other mild liquid, for the ſame purpoſe:—And laſtly, it has been propoſed to introduce a quantity of quickſilver into the ſac through the lacrymal puncta, the weight and fluidity of which being ſuppoſed well fitted for making it paſs through any ordinary degree of obſtruction.

Mr Anel, a French practitioner, was the firſt who brought to any perfection the method of introducing a probe, or the point of a ſyringe, into the lachrymal ſac; but although any one acquainted with the anatomy of theſe parts, may accompliſh this in a ſound pervious ſtate of the lachrymal paſſages, yet in an obſtructed ſtate of the naſal duct it can ſcarcely be done, and, when effected, it is not found that ſo much utility is derived from it as was at firſt expected.

Two modes are propoſed for effecting this operation: In the one, a ſmall probe, or tube of a ſyringe, is inſerted at one of the lachrymal puncta; and being inſinuated along the courſe of the correſponding duct, it is in this manner paſſed into the ſac, and from thence we are directed to carry it through the naſal duct into the noſe: Or, when this cannot be fully accompliſhed, we are deſired to force an opening through this duct by an injection thrown in with a ſyringe inſerted at one of the puncta. The ſyringe above mentioned, with the ſmall tubes correſponding to it, as delineated in Plate XXXVII. is the inſtrument recommended for this purpoſe. By the other mode of doing the operation, a curved probe, or tube, of a larger ſize, ſuch as is delineated in fig. 4. of the ſame Plate, is to be inſinuated into the noſtril of the diſeaſed ſide; and the point of the inſtrument being paſſed in beneath the edge of the os ſpongioſum inferius, it is to be eaſily moved about till it meets with the termination of the naſal duct of the lachrymal ſac; when it muſt be cautiouſly carried forward till it paſſes into the ſac itſelf.

Different objections, however, occur to theſe operations. The puncta lachrymalia are ſo very ſmall, that no probe or ſyringe can be paſſed through them of a ſufficient ſize for removing any obſtruction in the naſal duct. And although a ſyringe of a

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PLATE. XXXVII.

FIG. 1.

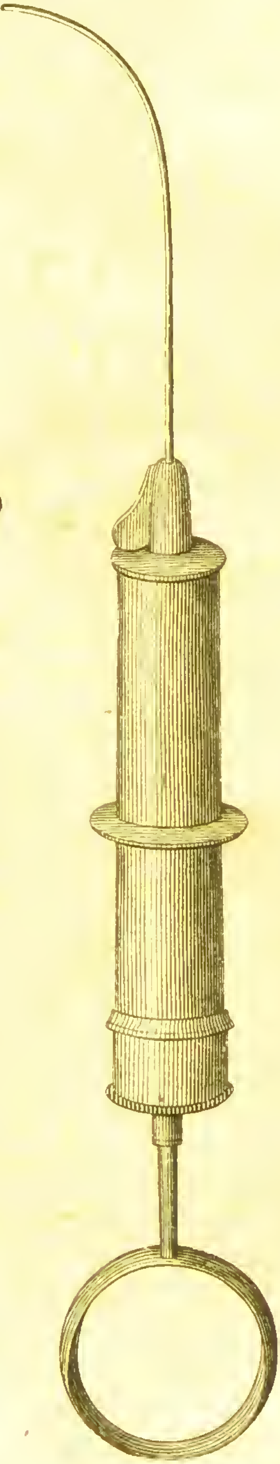


FIG. 2.

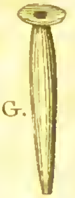
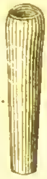


FIG. 3.



IG. 4.

FIG. 5.

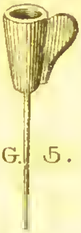


FIG. 6.

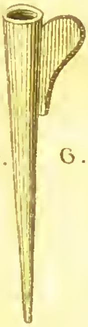
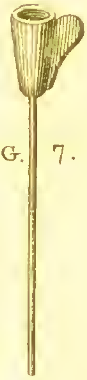


FIG. 7.



8.

FIG. 9.

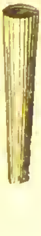


FIG. 10.

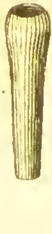
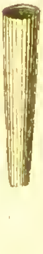


FIG. 11.



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larger ſize may in a ſtate of health be introduced through the noſtril directly into the naſal duct itſelf, in a diſeaſed ſtate of theſe parts it can ſeldom be done but with much pain and difficulty. In obſtructions of this duct, as they very commonly ariſe from inflammation communicated from the membrane of the noſtrils, the diſeaſe firſt commences in the extremity or termination of the canal; ſo that it is always difficult and often impoſſible to introduce a probe or a ſyringe into it; and if the operator is even ſo fortunate as to accompliſh this, it always requires ſome violence to force it into the lachrymal ſac. Hence a good deal of pain is produced, by which the duct and ſac are both apt to become inflamed; ſo that, inſtead of any advantage being derived from the practice, much miſchief is apt to enſue.

The propoſal of curing affections of this nature by injections, is very ingenious; but, for the reaſons I have mentioned, it will ſeldom I imagine be of much utility. We are indeed told, that it will often prove effectual in caſes of ſlight obſtruction; and that all the pain and uncertainty of the ordinary means of cure may thus be prevented. But when an obſtruction is completely formed, it is altogether inadmiſſible, from the impoſſibility of introducing a probe; and whenever a partial ſtoppage only occurs to the paſſage of the tears into the noſe, much riſk will be incurred of doing more harm than good, by the irritation, pain, and conſequent inflammation induced by the operation. In ſuch circumſtances the patient ſhould rather ſubmit to any inconvenience attending the diſeaſe, than to an uncertain trial of this kind.

For the ſame reaſons that the paſſing of a probe, and of injections, into the lachrymal paſſages, can ſeldom if ever prove uſeful, the introduction of quickſilver into the lachrymal ſac will likewiſe be in all probability found to prove unſucceſsful; Where the obſtruction is already formed, it will not be able to remove it; and unleſs obſtruction takes place, no attempt of this kind is indicated. The practice, however, is ingenious; and as it may be done with more eaſe, ſo it is leſs exceptionable than the uſe of probes or injections.

We have thus deſcribed the modes of treatment which have been propoſed in this the moſt ſimple ſtage of the diſorder; but we muſt again obſerve, that as long as no farther inconvenience is experienced from it than a watery or weeping eye, with perhaps a ſlight tumefaction forming now and then in the corner of the eye, nothing ſhould be adviſed but moderate preſſure applied from time to time with the finger.

But when either by improper management, or by any other cauſe, ſymptoms take place which produce either much pain or deformity, a different mode of treatment becomes neceſſary. When the tumour in the angle of the eye becomes larger, inflamed, and painful, as the matter collected in it will be found ſharp and acrid if it be not ſoon diſcharged, ſome additional diſtreſs will probably enſue from the contiguous bones being affected by it.

In ſuch circumſtances, a perſon not acquainted with the anatomy of the diſeaſed parts, and with the cauſe of the diſorder, would be induced to truſt entirely to an opening being made in the tumour ſufficient for diſcharging the matter contained in it: For, in this ſtate of the diſeaſe, it aſſumes exactly the appearance of a common boil or abſceſs; and therefore this method of treatment might be conſidered as proper and applicable. But although ſome temporary advantage might thus be derived from the diſcharge of the matter contained in the ſwelling, as the cauſe of the diſorder would not be removed, a permanent cure it is evident could not be expected from it. We are here ſuppoſing that the diſeaſe originates from the naſal duct leading from the lachrymal ſac being obſtructed: It is clear, therefore, that the ſac only being laid open, will be attended with no farther benefit than that of producing an immediate diſcharge of its contents; for while the tears are conveyed into it by the puncta and ſmall ducts connected with them, if they do not find a free paſſage into the noſe, they muſt neceſſarily be either diſcharged by the opening newly formed, or, if this is allowed to heal, they will again collect and produce a tumour ſimilar to the firſt.

In this ſituation, therefore, our views muſt be—To diſcharge the contents of the ſwelling—To procure a free paſſage in future for the tears from the lachrymal ſac into the noſe—And to prevent it from being again obliterated. And this being accompliſhed, the external opening muſt be healed up.

While a ſwelling of this kind continues firm and hard, it would be improper to lay it open, as it would not only be attended with more pain, but the parts beneath could not be ſo freely examined as if the ſkin and other teguments were previouſly lax and ſoft. So long, therefore, as much hardneſs continues, a warm emollient poultice ſhould be kept conſtantly applied over all the parts affected; and as ſoon as the tumour becomes ſoft and compreſſible, an opening may with freedom be made into it. On account of the contiguity of the eye, and of the inſertion of the orbicularis muſcle, it has in general been conſidered as a nice and hazardous operation, the making an inciſion into the lachrymal ſac; and particular directions have been given, not only for the figure and ſize of the inciſion, but for diſcovering the exact ſite of the ſac.

There is no neceſſity, however, for treating this point with ſo much attention; for the ſituation of the ſac is always aſcertained with preciſion by the tumour itſelf, which is formed, as we have already obſerved, by tears and mucus collected in the ſac; ſo that any inciſion that diſcharges this collection muſt for certain reach the ſac. Neither does the form of the opening make any difference in the hazard attending the operation. A ſemilunar cut has commonly been recommended; not only with a view to render the opening larger, but in order, as it is ſaid, to avoid with certainty the tendon of the orbicularis muſcle. There is no riſk, however, of this tendon being injured if the inciſion be made where it ought to be, viz. in the moſt prominent and moſt depending part of the tumour; and it is eaſier done with a common lancet than with any other inſtrument. The point of the lancet ſhould be puſhed into the ſuperior part of the ſwelling fairly into the ſac, and ſhould be carried downwards in a ſtraight direction to the moſt depending part of it. A few fibres of the orbicularis muſcle which are inſerted into and ſpread over the lachrymal ſac, will be divided indeed by the inciſion; but no inconvenience is found to enſue from this. And a ſtraight cut, ſuch as we have directed, admits of a very free examination of the parts beneath, at the ſame time that it ſerves to evacuate more effectually than any other the tears and mucus collected in the tumour.

An opening being thus formed, the contents of the ſwelling are to be forced out by moderate preſſure; a doſſil of ſoft lint ſpread with emollient ointment ſhould be inſerted between the lips of the ſore, and a ſlip of moderately adheſive plaſter may be employed to retain it. As a plentiful diſcharge commonly takes place, it is neceſſary to renew the dreſſings daily; and with a view to preſerve the opening of a ſize ſufficient for admitting of a free examination of the parts beneath, inſtead of a doſſil of lint, a ſmall piece of ſponge, firmly preſſed after being dipped in melted wax, may be inſerted into the ſore every ſecond or third day: but as the ſwelling of the ſponge by the moiſture applied to it tends to irritate and inflame the contiguous parts, it ſhould previouſly be covered with a ſingle ply of oiled ſoft linen, which does not hinder it to ſwell, at the ſame time that it admits of its being more eaſily withdrawn; for the purpoſe, however, of removing it more readily, a piece of ſtrong waxed thread ſhould be attached to it.

In former times it was the common

practice, after opening the tumour, to endeavour to deſtroy the hard edges of the ſore, either with the actual or potential cautery, or with unguents impregnated with red precipitate, and other eſcharotics. By this the patient was made to ſuffer a great deal of unneceſſary pain; more deformity was produced; and the probability of a cure being effected was much leſs than when milder dreſſings are employed. Indeed the only method by which a cure could take place with ſuch treatment, was the total obliteration of the lachrymal ſac and ducts connected with it. Theſe being either deſtroyed, or a conſiderable degree of inflammation induced upon them, their internal ſurfaces were ſometimes made to adhere together on preſſure being applied to them. This, however, could not frequently happen; for while the puncta lachrymalia and ducts connected with them remained open, the tears ſtill finding acceſs to the parts beneath, would neceſſarily produce frequent returns of the diſorder; and when by the violence of the inflammation theſe ducts happened to be obliterated, ſtill the patient would be liable to a conſtant trickling of the tears over the cheek. This idea, therefore, ought never to be kept in view. Inſtead of eſcharotic applications, the mildeſt dreſſings only ſhould be employed; nor ſhould the doſſils of lint or of ſponge we have adviſed, be of ſuch magnitude as to produce much pain; all that is expected from them being to dilate the lachrymal ſac in order to admit of as free an examination as poſſible for the commencement of the duct leading from it to the noſe.

By this management, any hardneſs remaining in the edges of the cut will ſoon be removed; and the ſore being ſufficiently cleared of a tough viſcid kind of mucus, ſomewhat reſembling ſloughs, which for a few days after the operation it is always covered with, we are now to proceed to the moſt important part of the cure, the forming of a free paſſage for the tears from the lachrymal ſac into the noſe.

This part of the operation is effected in

PLATE. XXXVIII.

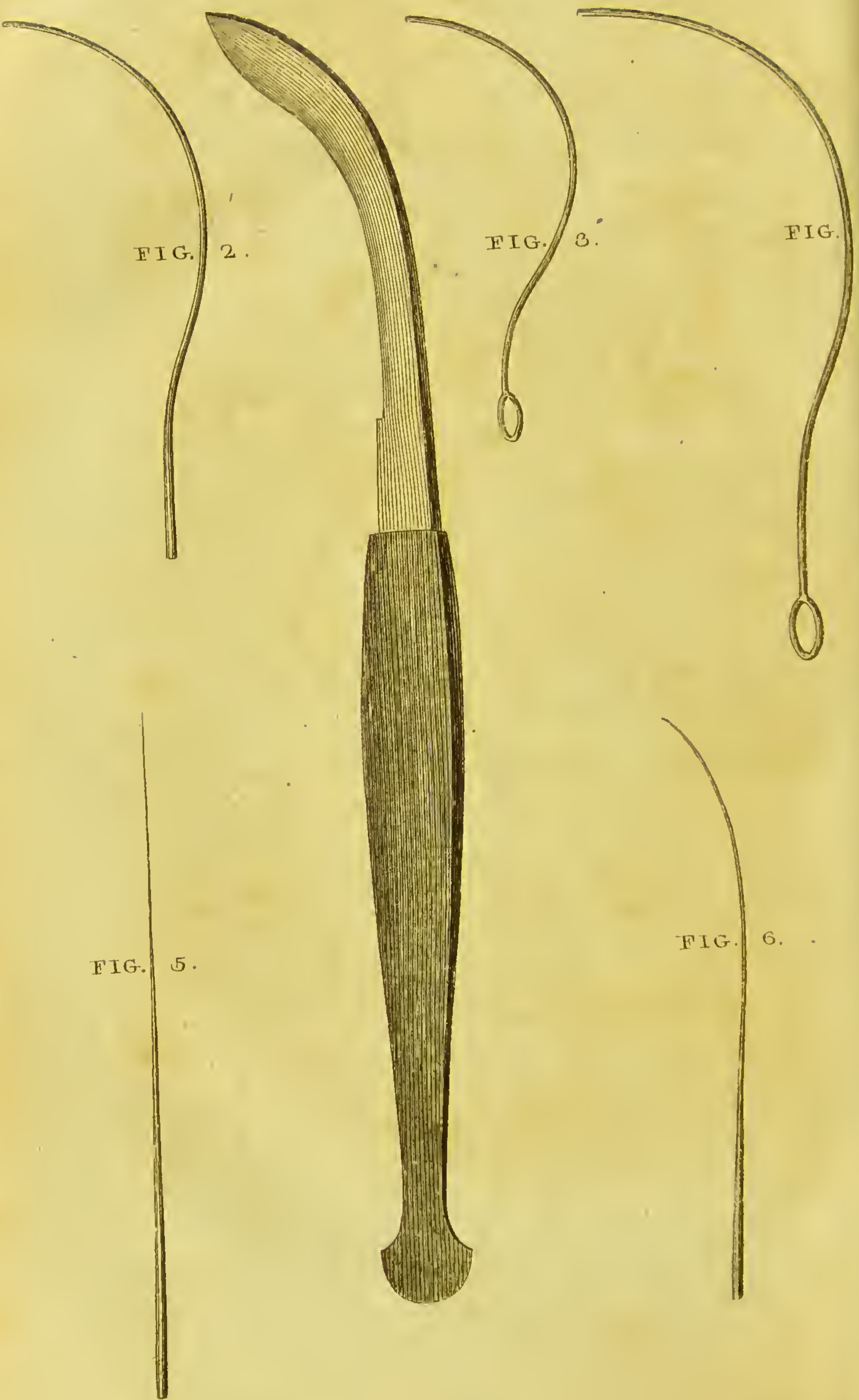

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.

FIG. 6.

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two different ways: By clearing the natural duct leading from the lachrymal ſac through the groove in the os unguis into the noſe: Or, when this is found to be impracticable, by forming an artificial opening directly through the ſubſtance of this bone from the under and back part of the lachrymal ſac.

As we ought always to avoid every kind of unneceſſary violence, we ſhould firſt endeavour, by every probable method, to diſcover the natural conduit of the tears, and to remove the obſtruction formed in it. For this purpoſe, a firm round-pointed probe ſhould be inſerted into the bottom of the lachrymal ſac; and if the point of it can be inſinuated into the commencement of the naſal duct, ſome hope may be entertained of the paſſage being rendered pervious: ſome degree of force will be neceſſary indeed for effecting this; but whenever it can be done, which ſometimes happens, by the probe being puſhed forward in a proper direction with moderate preſſure, it ought always to be preferred to every other method of treatment.

The paſſing of the probe into the noſe is the moſt difficult as well as the moſt uncertain part of this operation; for when this is accompliſhed, we are in general able to preſerve the opening by keeping a piece of bougie, of cat-gut, or of lead-wire, conſtantly inſerted into it, till the paſſage of the duct is rendered perfectly clear and pervious. But it often happens, that every trial we can make for diſcovering the naſal duct proves ineffectual; and when the probe cannot with great eaſe be inſerted into the commencement of it, much force ought by no means to be employed; for as it will more readily be puſhed againſt the bone than into the duct, it would be much more apt to do harm than good. When it enters the ſuperior part of the canal with eaſe, it may with ſafety, and with ſome probability of ſucceſs, be puſhed forward in the manner we have mentioned; but when the duct is obliterated through its whole courſe by the ſides of it adhering together, an occurrence which we believe to be frequent, and which we conclude to take place when the duct cannot be diſcovered by a probe inſerted into the lachrymal ſac, it would be highly improper, for the reaſon we have mentioned, to uſe any violence in endeavouring to detect it.

When therefore every trial for diſcovering the natural paſſage between the lachrymal ſac and the noſe proves unſucceſsful, as we know that a cure will not be obtained if the tears are not conveyed into the noſe, our views muſt now be directed ſolely to the formation of an eaſy and free artificial opening for this purpoſe.

In the anatomical deſcription we have given of theſe parts, we have ſeen, that the poſterior part of the lachrymal ſac is lodged in and attached to a groove in the os unguis; and as the ſac is ſeparated from the cavity of the correſponding noſtril by this bone only covered behind with the common membrane of the noſe, it is evident that an opening made from the back part of the ſac muſt ſerve to convey the contents of it into the noſe. It is this part of the operation we have now to conſider.

We have already obſerved, that the actual cautery uſed formerly to be employed for deſtroying the hard edges of the ſore, and as it was a prevailing opinion with almoſt all the practitioners of the laſt and preceding centuries, that this diſorder is connected with a carious ſtate of the correſponding bones, the cautery was likewiſe uſed for aſſiſting in the exfoliation of the diſeaſed parts. In conſequence of this, a cure was ſometimes accompliſhed by a remedy that was employed only for the removal of what was conſidered as an accidental occurrence, and not as a cauſe of the diſorder: For the os unguis being extremely thin, a hot iron can ſcarcely be applied to it without deſtroying the ſubſtance of it entirely; and as this happened in ſome inſtances, a cure was obtained even where the practitioners who employed the remedy were totally ignorant of the manner in which it acted; for as they were unacquainted with the real cauſe of the diſeaſe from their ignorance of the anatomy of the parts concerned in it, we cannot attribute their ſucceſs to any other cauſe than accident alone.

It is ſurpriſing, however, to find even in later times, when the cauſe of the diſorder is well known, and when the principles of the operation are founded on an exact knowledge of the parts affected, that the ſame method of treatment has been continued. Till of late, the actual cautery was very commonly employed for perforating the os unguis by the beſt ſurgeons of this country. Even the celebrated Cheſelden patroniſed this method; and it is ſtill practiſed in ſeveral parts of the Continent.

With all the caution, however, that can be employed, of covering the hot iron with a canula, with wet clothes, &c. it is an uncertain and dangerous practice; for parts muſt be deſtroyed, or at leaſt much injured with it, which ought not to be hurt, as it is perfectly impoſſible to convey a red-hot iron to the os unguis, and to deſtroy part of this bone, which alone ought to be perforated, without much miſchief being done to the contiguous parts.

The cautery ought therefore to be laid entirely aſide; and this the more readily, as the ſame intention can be accompliſhed with equal certainty, and with more eaſe and ſafety, in a different manner, merely by forcing any firm ſharp inſtrument from the back part of the ſac through the os unguis; but nothing anſwers ſo well for this purpoſe as a common trocar. A curved inſtrument of this kind has commonly been employed, ſuch as is repreſented in Plate XXXVI. fig. 5. but the ſtraight trocar, delineated in the ſame Plate, fig. 2. is preferable. By means of it the opening thro' the bone may be made, either by twirling it round between the fingers, by moving it forward and backwards with the fingers and palm of the hand, or by puſhing it ſtraight forward, according to the inclination of the operator; and the ſurrounding parts may

be

be protected, at the ſame time that the inſtrument is more ſteadily fixed than it otherwiſe can be, by paſſing it through a canula, ſuch as is delineated in fig. 4.: Whereas when the curved trocar is employed, no canula can be uſed along with it; and in perforating the bone, it cannot be turned and moved with ſuch freedom as the other.

In proceeding to this part of the operation, the patient's head ſhould be ſupported by an aſſiſtant; and the ſurgeon, ſitting or ſtanding between him and the window, muſt introduce the canula of the trocar into the opening made in the tumour; and the end of it being carried to the under and back part of the ſac, it muſt be kept firm in this ſituation with one hand, while the ſtilette is inſerted into it with the other; and the point of it muſt now be carried gradually forward till it has paſſed freely into the noſtril; which is known to take place on a ſmall quantity of bloody mucus paſſing out at the point of the noſe.

In making this perforation, much attention is neceſſary in carrying the inſtrument forward in a proper direction. If turned in any degree outward, it would penetrate the orbit;—poſteriorly, it would paſs into the ethmoid bone;—and if puſhed in a horizontal direction towards the noſe, the os ſpongioſum ſuperius would be injured by it, while the intention of the operation, that of affording a free paſſage for the tears into the noſe, would be entirely fruſtrated. In order to avoid theſe inconveniences, the inſtrument ſhould be puſhed on towards the noſe in an oblique direction downwards from the inferior part of the lachrymal ſac. Care ſhould be taken, however, not to endeavour to follow the courſe of the natural paſſage of the tears, as by ſome we are directed to do; for in this manner we are not only apt to injure the maxillary bone, which is not by any means neceſſary, but the opening cannot but with much difficulty be made ſo free and large as when the perforation is made in that part of the os unguis where the lachrymal ſac terminates, and where the commencement of the naſal duct takes place.

On the inſtrument having penetrated the noſtril, it ſhould be moved with ſome freedom; not by carrying it farther in, as this might injure the parts within the noſe; but by giving it a free rotatory motion, ſo as to render the opening made with it ſufficiently pervious: And this being done, the ſtilette ſhould be withdrawn, when a lead-probe, fully equal to the ſize of the canula, ſhould be introduced, and then the canula may be likewiſe taken out. One extremity of the lead ſhould paſs freely through the opening in the os unguis, and the other muſt project about the eighth part of an inch or thereby paſt the level of the external ſore. With a view to prevent it from ſlipping altogether into the noſe, this projecting part of it ſhould be ſomewhat curved after the canula is withdrawn. The ſore muſt now be covered with a ſmall pledgit of lint ſpread with emollient ointment, and the whole may be retained with a ſlip of adheſive plaſter; for no bandage can be properly adapted to theſe parts without being productive of much inconvenience.

In this manner the operation is completed; but much attention is neceſſary on the part of the ſurgeon to preſerve the opening that is thus formed, and to prevent it from filling up in future. With this view, the lead-probe muſt be continued for a conſiderable time, in order to render the paſſage as callous as poſſible, care being taken to withdraw it every day or two for the purpoſe of clearing it and the ſore from any impurities; and at each dreſſing a quantity of infuſion of oak-bark, a ſolution of alum, or any other aſtringent, ſhould be injected with a ſmall ſyringe from the external opening into the noſe. The ſyringe, fig. 1. Plate XXXVII. anſwers this purpoſe properly.

No certain period can be fixed at which we can ſay the paſſage will be ſufficiently callous, and at which the lead-probe may be withdrawn; for this will in ſome meaſure

ſure depend upon the conſtitution of the patient, as well as on the particular ſtate of the parts themſelves. In ſome inſtances, it may poſſibly be done with ſafety in a ſhorter period; but I have never ventured on taking away the lead till the eighth or ninth week from its firſt introduction. The inconveniences attending it are inconſiderable; and we are to remember, that the operation proving ſucceſsful or otherwiſe is to depend almoſt entirely on due attention to this part of it; for if obſtruction ſhould afterwards occur, either from the opening in the bone filling up with callus, or from the ſofter parts adhering together, the patient will ſoon be in the ſame diſeaſed ſtate as he was before any attempt was made towards a cure.

On withdrawing the lead, the external opening ſhould be cleared from any mucus with which it may be ſtuffed; and as by this time it will be reduced to a very ſmall ſize, it will ſoon heal merely by laying the ſides of it together, and covering it with a piece of adheſive plaſter: Or, when this does not prove effectual in a few days, touching the edges of the ſore with a bit of cauſtic will in general complete the cure very quickly. In the mean time, moderate preſſure ſhould be applied upon the courſe of the lachrymal ſac, either by the finger of the patient being frequently laid upon it, or by means of the machine, Plate XXXVI. fig. 1. And this ſhould be continued for a conſiderable time, till there is reaſon to imagine that the ſac and contiguous parts have again recovered the tone they have loſt by the long continuance of the diſeaſe, as well as by the operation.

What we have ſaid reſpecting the propriety of continuing the lead-probe for a conſiderable time, and of applying preſſure afterwards on the courſe of the ſac, is equally applicable when the natural paſſage of the tears has been diſcovered as when an artificial opening is formed in the manner we have mentioned. Indeed more attention is neceſſary to this point in the one caſe than in the other; for we find by experience, that the diſeaſe is more apt to return when the operation is finiſhed by the tears being carried through the naſal duct, than when an artificial opening is made for them; owing, as I imagine, to a wider and more free paſſage being commonly formed by this laſt mode of operating.

Inſtead of a probe of lead, ſome practitioners employ a piece of catgut or of common bougie; but neither of theſe anſwer the purpoſe ſo well. They are more difficult to introduce;—they retain the mucus of the part, and therefore are not ſo cleanly; —they are apt to be entangled by the newly-divided bone; and they are not found to prove ſo effectual in rendering the paſſage callous as the other.

We have thus deſcribed the different ſteps of the operation; and the practice we have adviſed is ſuch as experience has proved to be the moſt ſucceſsful. It muſt indeed be acknowledged, that it does not in every inſtance ſucceed; for caſes frequently occur which render fruitleſs every attempt that can be made for curing them. After performing the operation in the moſt ſatisfactory manner; when the paſſage for the tears has been rendered completely pervious; and even where external preſſure has afterwards been continued in the moſt attentive manner; yet after all, the diſeaſe is ſometimes found to return again. In ſuch inſtances, however, we conclude, that ſcrophula, or ſome other diſeaſe of the conſtitution, takes place; by which alone, or by the contiguous bones being carious, this operation, when properly performed, can be rendered abortive. It may ſometimes indeed fail by too ſmall an opening being formed in the os unguis; but this is the fault of the operator, and not of the operation. There is no cauſe for timidity on this point: for although it has been alleged that miſchief may enſue from breaking this bone with the trocar, yet daily experience tends to prove the contrary; for even where it has been broke with much freedom, I never knew an inſtance of any inconvenience ariſing from it. With a view to prevent the bad conſequences which thoſe not accuſtomed to this operation have ſuppoſed would occur from the ſplintering of this bone with a trocar, it has been propoſed to take out a piece of it entirely with a ſharp cutting inſtrument, ſuch as is delineated in Plate XXXV. fig. 3.

By applying this inſtrument to the os unguis, in the ſame manner as we have directed for the uſe of the trocar, a portion of the bone may be eaſily cut out; but there is no neceſſity for this precaution. The operation is more effectually done with the trocar; and as no danger is found to occur from it, it ought to be preferred.

In the treatment of this diſorder, when it is unfortunately found to return even after the operation has been properly performed, if it is imagined that this is owing to a carious ſtate of any part of the contiguous bones, a cure may yet be accompliſhed by laying the tumour again open; by endeavouring to accompliſh an exfoliation of the diſeaſed bone; and by afterwards forming another opening in the os unguis in the manner we have directed. But when a relapſe of the diſeaſe is experienced, without any cauſe of this kind, as any opening we might form in the bone would in all probability be ſoon filled up by the ſame affection of the ſyſtem continuing which rendered the firſt attempt fruitleſs, it could anſwer no purpoſe to repeat it, were it not with a view to make trial of a different mode of operating.

It was propoſed a conſiderable time ago by different practitioners, to obviate the uncertainty attending this operation, by introducing a ſmall canula of gold or ſilver, either through the natural paſſage of the os unguis; or, when this cannot be diſcovered, through an opening made with a trocar or any other ſharp inſtrument; and by leaving the canula, and healing the ſkin over it, thus to form a paſſage which no diſeaſe of the conſtitution can have any effect upon. By thoſe who conſider the uſual operation for the fiſtula lachrymalis as very uncertain, it has been propoſed to employ a canula of this kind in every caſe; but as this operation, when properly performed, proves for the moſt part completely ſucceſsful, and as patients in general conſider it as a formidable matter to have any extraneous body left in a wound with a view to remain, I would not adviſe it in any caſe till we find by experience that the other does not ſucceed. In every caſe, however, where the uſual operation has failed, the method of cure by a canula ought to be tried; and I believe it will frequently ſucceed.

Every inſtrument of this kind ſhould be made of gold, as being leſs apt to be acted upon by the fluids of the part affected than any other metal; and much care ſhould be taken to have the canula well poliſhed, and as exactly fitted as poſſible to the parts in which it is to be placed. When properly fitted, it gives little pain, even from the firſt introduction; and at laſt it frequently ſits with ſo much eaſe, that the patient is apt to ſuſpect it has dropped out.

In Plate XXXVII. fig. 2. 3. 8. 9. 10. and 11. different forms are delineated of theſe tubes, but of theſe fig. 3. & 10. are to be preferred. Thoſe here repreſented are of a length which is found to anſwer in the moſt part of adults; and their diameter ſhould be as large as the opening in the bone can admit, with a view to prevent, with as great certainty as poſſible, the tears and mucus which may paſs through them from ſtopping them up. The upper part of the canula ſhould be ſomewhat wider or thicker than the inferior part of it, otherwiſe it is apt to paſs entirely through the opening in the os unguis into the noſe. This ought by all means to be guarded againſt; and it is effectually done by this form of the tube being adopted.

When a canula is to be employed, the previous ſteps of the operation muſt be finiſhed in the manner we have mentioned; only there will be no neceſſity for continuing the lead for any conſiderable time. It ought however to be continued till any inflammation excited by the operation is gone, and till the opening formed in the os unguis is become ſomewhat callous, when the ſize of the tube being aſcertained by the diameter of the lead, it muſt now be inſerted into the wound; and the length of it ſhould be ſuch as admits of the inferior point of the tube paſſing fairly through the os unguis, while the upper part of it is eaſily covered by the ſkin and other teguments. Much attention ought to be paid to the length of the tube: for if it be too ſhort, it will not anſwer the purpoſe; and if too long, it will irritate and inflame the ſkin which covers it; by which the cure of the ſore will be impeded, and after all it will be neceſſary to take it out for the purpoſe of ſhortening it: Whereas when the canula is of a proper length, the ſore heals as readily as if no extraneous body was applied to it.

In deſcribing the progreſs of this diſorder, we had occaſion to obſerve, that the tumour which forms in the corner of the eye when it inflames and ſuppurates, proceeds at laſt to a ſtate of ulceration. This circumſtance, however, does not point out any difference in the method of treatment; only in this caſe, inſtead of uſing a lancet for laying the ſac more freely open, an inciſion ſhould be made with a ſcalpel upon a director introduced at the ulcer. In every other point the cure is to be conducted as we have already directed, by rendering the natural paſſage of the tears pervious when this is found to be practicable; and when this cannot be effected, by making an artificial opening through the os unguis.

When, again, the os unguis and other contiguous bones are found to be carious, we muſt preſerve the ſores open till the diſeaſed parts are all removed; when, if a large enough opening is not formed for the paſſage of the tears by the pieces of bone which have been taken away, it may now be made, and every other ſtep of the operation may be done in the manner we have already pointed out. In local affections of theſe bones, a cure may thus be in ſome inſtances accompliſhed; but where the caries depends upon a venereal taint, as is not unfrequently the caſe, although a well-conducted courſe of mercury may cure the general diſeaſe of the conſtitution, it is ſeldom able to prevent very extenſive exfoliations of the affected bones; by which, the natural paſſage of the tears being deſtroyed, and the bones through which they ſhould be conveyed being either altogether removed, or perhaps rendered perfectly flat, they muſt in future paſs entirely over the cheek; for in ſuch circumſtances art can afford no relief.

EXPLANATION OF THE PLATES.

PLATE XXV.

[Oppoſite to page 59.]

Fig. 1. The handle of the trephine. This part of the inſtrument has in general been made of ſteel; but it is uſed with much more eaſe and freedom when that part of it on which the hand reſts, is made of timber, and of the form here repreſented.

Fig. 2. The ſaw, or head of the trephine. The upper part of it muſt be made to fit with exactneſs an opening in the under part of the handle, ſo that when inſerted into it the hole *B* may be oppoſite to the end of the ſcrew *A;* when, by turning the ſcrew, the two pieces may be firmly connected together.

C, The nut of a ſcrew paſſing through a ſlit in the handle, and fixed in the upper part of a moveable pin *D*. In uſing this inſtrument, the point of the pin *D* is made to project paſt the teeth of the ſaw, till an impreſſion is made upon the ſkull of a ſufficient depth for retaining it, when the pin ought to be removed. This is eaſily done by moving the nut *C* to the upper part of the ſlit, and fixing it by turning the ſcrew.

All the parts of the trephine are here repreſented of a full ſize for uſe. The diameter of the ſaw, viz. the breadth from one ſide of the head to the other, ſhould not be leſs than an inch. Of this ſize it is uſed with the ſame eaſe as when made conſiderably ſmaller; and the opening formed by it being larger, it anſwers the intention of the operation better.

Fig. 3. A head of a ſmaller ſize, ſuch as is commonly employed. The pin *E* is in this inſtrument fixed by a ſcrew into the bottom of the head, and is taken out by means of the key, fig. 4.: But the method of moving the ſcrew, as is repreſented in fig. 2. is in every reſpect better than this.

Fig. 5. A perforator for forming a ſmall hole in the centre of the piece of bone on which the trephine is to be applied, and into which the pins *D E*, figures 2. and 3. muſt be inſerted. The perforator muſt be exactly adapted to the handle of the inſtrument; to which it muſt be fixed by the ſcrew *A*, in the manner we have directed for connecting the head to it.

PLATE XXVI.

[Oppoſite to page 60.]

Fig. 1. A repreſentation of all the parts of the trephine connected together, and ready for uſe.

Fig. 2. A pair of forceps, for the purpoſe of removing detached portions of a fractured ſkull: They are alſo uſed for taking out any piece of the ſkull that has been ſeparated or cut out by the trephine, when it does not come away with the head of the inſtrument. Any other form of forceps would anſwer the purpoſe equally well, but the one here delineated is moſt frequently employed.

Fig. 3. A head of a trephine with longer teeth than the inſtrument in common uſe; and along the courſe of the ſaw there are three vacuities in which the teeth are altogether wanting. By this mechaniſm it is ſuppoſed that a piece of bone may be cut out more quickly than with the common trephine, and that the inſtrument will not need to be ſo frequently removed for the purpoſe of clearing the cut of the ſmall fragments of bone produced by the ſaw. When the teeth of this ſaw are ſufficiently firm and properly ſet, it cuts both quickly and ſmoothly; but I have not yet uſed it ſo frequently as to be able from my own experience to ſpeak deciſively about it.

PLATE XXVII.

[Oppoſite to page 73.]

Fig. 1. This figure repreſents the inſtrument named a Trepan. As the page does not admit of the full ſize, every part of it is about one-third leſs than it ought to be for common uſe. The upper part of the

handle

handle of the inſtrument is made of timber ; all the reſt of it ſhould be of poliſhed ſteel.

For the reaſons we have elſewhere mentioned, every operator ought to be provided with this inſtrument, as well as with the trephine. And as the ſame heads may be made to fit both the one and the other, the expence attending them is inconſiderable.

Fig. 2. An inſtrument commonly termed a Lenticular. It is uſed by ſome practitioners for ſcraping the edges of the opening in the bone formed by the head of the trepan when they are in any degree rough. For this purpoſe it is ſharp on one ſide ; and the button at the top is meant to receive the pieces of bone which fall from it. There is very rarely, however, any occaſion for uſing it. I have never found it neceſſary; but as it forms a part of the apparatus employed by modern ſurgeons in the operation of the trepan, I have judged it proper to give a delineation of it.

Fig. 3. A raſpatory for removing the

pericranium. This inſtrument, if uſed with caution, may prove ſerviceable by admitting of an eaſy and free application of the trepan; but no more of the ſkull ſhould ever be denuded than is merely neceſſary for allowing the ſaw to be applied with freedom.

PLATE XXVIII.

[Oppoſite to page 88.]

Figures 1. and 2. The different parts of a levator, nearly the ſame with that of Mr Petit, mentioned in p. 88. Fig. 1. A frame ſupported by two feet, with a pin and moveable ball on the ſuperior part of it. This pin muſt be of a ſize correſponding to the holes in the levator fig. 2. and the ball muſt be made to move with freedom in every direction; by which means the point of the inſtrument may be carried with eaſe from one part to another, while the frame on which it is fixed is kept firm in its ſituation by an aſſiſtant.

Fig. 3. The two parts of this inſtrument joined together, and ready for uſe.

Fig. 4. The levator employed in common practice. But as this inſtrument, while it elevates one part of the ſkull, muſt preſs with conſiderable force upon another, it ought to be laid entirely aſide. And this can be more readily done, by the levator, fig. 3. being found to anſwer every purpoſe for which the other is employed, while it is not productive of any of the inconveniences which frequently reſult from it.

PLATE XXIX.

[Oppoſite to page 238.]

Fig. 1. A bandage for the eyes; by which any quantity of light can be admitted that a patient may wiſh for, while at the ſame time the eyes are ſufficiently protected, without being kept too warm, or too cloſely tied down, as is commonly the caſe with the bandages uſually employed. It conſiſts of two pieces of poliſhed timber excavated into the form of cups, correſponding to the ſize of the eyes for which they are intended: And theſe being covered with a black or green riband, the inſtrument is complete.

Fig. 2. A cup of an oval form, for the purpoſe of bathing the eyes either with water or with any other liquid. Being of an oval form, correſponding to the ſize and figure of the orbit, the eye can be more effectually waſhed or bathed in any liquid contained in it than it can eaſily be in any other manner.

Fig. 3. A bag of the reſina elaſtica, fitted with an ivory pipe, for the purpoſe of throwing warm water between the eye-lid and ball of the eye, in order to remove ſand, lime, or any other extraneous matter that happens to be lodged between them.

Figures 4. and 5. Pipes of different forms, which may occaſionally be fitted to one of theſe bags.

Fig. 6. A flat hook, which may be made either of poliſhed ſilver or ſteel, for ſeparating the eye-lids from each other. This may be frequently done by the fingers of the operator, or by an aſſiſtant; but in many of the more minute operations on

the eye, a flat hook of this kind is employed with much advantage: ſo that every ſurgeon accuſtomed to this branch of buſineſs ought to be provided with them.

PLATE XXX.

[Oppoſite to page 244.]

The figures of this plate repreſent different views of an inſtrument frequently mentioned in the courſe of this volume. Various forms of a ſpeculum oculi have been delineated in books; but they have ſeldom been uſed in practice. They have in general been found either to compreſs the eye too much, ſo as to induce pain and inflammation; or not to fix it ſufficiently. The inſtrument here repreſented, when properly poliſhed, creates very little uneaſineſs, at the ſame time that the eye may be ſo compreſſed by it as to be rendered perfectly ſteady. The handle of it may be either of ſteel or timber, but the reſt of it ought to be either of ſilver or of fine poliſhed ſteel. Operators ought to be provided with ſpecula of different ſizes. The views here delineated are taken from a ſize which anſwers the eyes of the moſt part of adults.

A well adapted ſpeculum is an uſeful inſtrument in many diſeaſes of the eyes, but particularly in the operations of couching and extracting the cataract. As it has been imagined that it may be an advantage to be able to withdraw the ſpeculum while the knife or needle remains in the eye, it has been propoſed to leave a vacant ſpace for this purpoſe in the circle which ſurrounds the eye-ball, as is repreſented in fig. 3. The ſpeculum ſhould be always kept, however, upon the eye, as long as either the extracting knife or couching needle remains in it, otherwiſe the eye cannot be rendered ſufficiently ſteady: But to thoſe who are of a different opinion, this form of the inſtrument delineated in fig. 3. will anſwer the purpoſe exactly.

Plate XXXI.

[Oppoſite to page 321.]

Fig. 1. A delineation of ſome parts of the eye, referred to in different ſections of this volume. It is taken from an accurate repreſentation of the eye by Zinn *.

a, Theſe points repreſent the openings or orifices of the glands of Meibomius; by which a viſcid glutinous ſubſtance, commonly termed the Gum of the Eyes, is ſeparated and diſcharged.

d, The caruncula lachrymalis.

c, The membrana ſemilunaris, which ſeems to have ſome effect in directing the tears towards the puncta lachrymalia *b*, from whence they are conveyed by their correſponding ducts into the ſaccus lachrymalis *e*, and are afterwards tranſmitted to the noſtril by the naſal duct.

In the treatment of the fiſtula lachrymalis, it is of the utmoſt importance to be well acquainted with the anatomy of theſe parts. This delineation of them will convey a more exact idea of them than could be given by deſcription.

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* V. Deſcriptio Anatomica Oculi Humani Iconibus illuſtrata. Auctore Johanne Gottfried Zinn, M. D. &c.

Fig. 2. A ſharp-pointed inſtrument deſcribed page 430. From its figure it has commonly been termed a Haſta. It has long been uſed in different parts of the Continent, for fixing the eye in the operations of Extracting and Couching the Cataract. This proceeds, however, from the want of a more perfect inſtrument; and as the ſpeculum we have delineated in Plate XXX. anſwers the purpoſe with much more eaſe and certainty, the other will probably be now laid aſide.

Fig. 3. A very uſeful form of knife for various operations upon the eye-ball and eye-lids, and eſpecially for ſcarifying turgid blood-veſſels in an inflamed ſtate of theſe parts. A lancet is commonly uſed for this purpoſe: But this knife is uſed with more ſteadineſs; and being round or blunt on one ſide, it does not ſo readily injure the contiguous parts.

Fig. 4. A ſpeculum oculi, ſuch as is uſed in common practice. But the ſpeculum we have already deſcribed anſwers the purpoſe in every reſpect more completely.

PLATE XXXII.

[Oppoſite to page 416.]

Fig. 1. A couching-needle of the beſt form I have ever tried. It penetrates the eye more readily than the round needle, fig. 2. and the cataract is more eaſily depreſſed with it.

Fig. 3. A needle of a flat form ſimilar to fig. 1. with a ſmall curve near to the point. By this curve I have ſometimes thought that the cataract may be more eaſily depreſſed than with a ſtraight needle; but I have not yet uſed it ſo frequently as to be able to ſpeak with certainty about it.

Figures 4. and 5. Two needles, deſcribed page 427, for performing the operation of Couching, by entering the inſtrument at the internal angle of the eye, and puſhing it outwards towards the other. By which means the operation may be done upon the right eye with the right hand; whereas, with the common ſtraight needle, the left hand muſt be uſed for the right eye; by which the operation is ſeldom performed with ſufficient ſteadineſs.

All theſe inſtruments are delineated of a ſize exactly fit for uſe. The handles ſhould be made of light timber, and the ſteel part of them ſhould be poliſhed in the moſt exquiſite manner. None of them ſhould exceed forty grains in weight.

PLATE XXXIII.

[Oppoſite to page 436.]

Fig. 1. The form of knife recommended in page 436 for the operation of extracting the cataract. It ought to be tolerably firm, and highly poliſhed. Near the point both ſides of it ſhould be ſharp, by which the cornea is more eaſily penetrated, but backwards the upper edge of it ſhould be round; which not only gives more ſtrength to the inſtrument, but renders the riſk leſs of hurting the iris with it.

Fig. 2. A knife of the ſame form in the

cutting part of it with fig. 1. But by means of the curvature the operation may be performed on the right eye with the right hand of the ſurgeon.

Fig. 3. A knife commonly uſed in Germany for the operation of extracting the cataract. The form of this knife does not admit of its penetrating the cornea ſo eaſily as fig. 1. which is now therefore very generally preferred.

Fig 4. A ſmall ſcoop for removing either the whole body of the lens, or any part of it, when in the operation of extracting the cataract it happens to lodge either in the pupil or in the anterior chamber of the eye, between the iris and tranſparent cornea.

PLATE XXXIV.

[Oppoſite to page 443.]

Fig. 1. A delineation of the eye with the couching needle inſerted into it.

Fig. 2. The knife employed for dividing the cornea in extracting the cataract, is here repreſented inſerted acroſs the eye, be-

between the cornea and the iris. And in fig. 4. the cut is delineated which ought to be formed in the cornea in the uſual method of performing this operation. Fig. 3. repreſents the cornea divided in the ſuperior part of it, in the manner we have mentioned in pages 451 and 452.

PLATE XXXV.

[Oppoſite to page 456.]

Fig. 1. A delineation of a right eye with one of the curved needles of Plate XXXII. inſerted into it; by which it is evident that a cataract may be couched in the right eye with the right hand of the ſurgeon, with perfect eaſe and ſafety.

Fig. 6. Repreſents a curved knife inſerted beneath the cornea in the operation of extracting the cataract with the right hand from the right eye.

Fig. 2. A ſharp curved probe for removing the cataract when the operation is performed by making an opening behind the iris, as is directed in page 456.

Fig. 4. A pair of ſmall forceps, which

may occaſionally be employed for the ſame purpoſe.

Fig. 5. A flat curved probe, which ſhould be made either of gold or ſilver, for inſerting through the pupil in order to tear or form an opening in the capſule of the lens, ſo as to admit of an eaſy expulſion of the cataract.

Fig. 4. A tube of ſteel with an edge ſufficiently ſharp for penetrating a hard bone, by which a portion of the os unguis, correſponding to the ſize of the tube, may be removed, when in the operation of the fiſtula lachrymalis this may be judged proper.

PLATE XXXVI.

[Oppoſite to page 482.]

Fig. 1. An inſtrument mentioned in p. 510. for the purpoſe of compreſſing the lachrymal ſac. *AA*, A curved plate of ſteel covered with flannel or ſilk, and adapted to the forehead, upon which it is fixed by the ribands *CC*. *B*, Another plate of ſteel connected to the former;

which, paſſing back towards the occiput, ſerves to fix the machine with more certainty by means of the riband *C* at its extremity. *D*, A ſmall moveable bar of ſteel, paſſing through an opening in the plate *AA*, to be firmly fixed at any particular height by the ſcrew *F*. *G*, A ſmall cuſhion, or button of ſteel covered with ſilk or ſoft flannel; which being placed upon the corner of the eye immediately above the lachrymal ſac, any neceſſary degree of preſſure may be applied by means of the ſcrew *H*. The moveable bar *D* is ſeparated into two pieces by a ſcrew at *E*. So that by turning this ſcrew, the cuſhion *G* may be turned more or leſs outward at pleaſure, according to the particular form of the part on which it is to be applied.

The inſtrument, as it is here delineated, is intended for the left eye; but it is eaſily made to anſwer the right eye by moving the bar *D* into the ſlit or opening on the oppoſite ſide of the plate *AA*.

Fig. 2. A trocar and canula, for perforating the os unguis in the operation of

the fiſtula lachrymalis. Fig. 3. The ſtilette; and fig. 4. The canula repreſented ſeparately.

Fig. 5. A curved trocar; the inſtrument commonly employed for the fiſtula lachrymalis.

In page 504, I have mentioned ſome objections which occur againſt this form of the trocar; and at the ſame time I have endeavoured to ſhow, that the ſtraight trocar, which we have juſt deſcribed, is in every reſpect preferable.

PLATE XXXVII.

[Oppoſite to page 488.]

Fig. 1. A ſmall ſilver ſyringe, for the purpoſe of throwing liquids into the lachrymal paſſages. Fig. 4. A curved tube, adapted to the ſyringe, and of a proper ſize for being inſerted by the noſtril into the extremity of the naſal duct of the lachrymal ſac. Fig. 5. A ſmall tube, of a ſize correſponding to the lachrymal puncta, for throwing injections through theſe openings into the ſac. Figures 6. and 7.

Tubes of a larger ſize, for throwing liquids through the ſac into the noſe by an external opening, when this has either been made by an inciſion, or when the ſac has burſt in conſequence of tears and matter collecting in it.

Figures 2. 3. 8. 9. 10. and 11. Tubes of different forms, which have been employed in the operation for the fiſtula lachrymalis, when the paſſage through the os unguis cannot in any other manner be kept free and pervious. Of theſe, however, figures 3. and 10. are the beſt. The ſmall bulge with which they are formed, not only prevents them from paſſing thro' the opening altogether into the noſe, which cylindrical tubes are apt to do, but when they are once properly fixed, it prevents them from riſing againſt the ſkin, which they are otherwiſe ready to do. The tubes here repreſented are of ſizes, both as to length and thickneſs, which anſwer for the moſt part of adults; but theſe are circumſtances which muſt depend upon the nature of every caſe, and will accordingly

dingly be liable to ſome variety. Tubes for this purpoſe ought to be made of gold poliſhed in the fineſt manner.

PLATE XXXVIII.

[Oppoſite to page 499.]

Fig. 1. A curved ſcalpel, employed by ſome practitioners for extirpating the eye-ball. By its form, it is ſuppoſed to be well ſuited for this purpoſe; but the common ſtraight ſcalpel is by experience found to anſwer better.

Figures 2. 3. and 4. Curved probes, of a proper ſize for inſerting by the noſtril into the naſal duct of the lachrymal ſac, when it is judged proper to attempt to clear theſe paſſages in this manner.

Figures 5. and 6. Probes of a ſmaller ſize, for inſerting into the lachrymal puncta.

FINIS.

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